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The stress and coping literature has neglected to evaluate fully personality variables in the coping process. The behavioral approach and behavioral inhibition systems may affect cognitive appraisals of stressors and coping responses. This study evaluated young adults' coping strategies from a three-dimensional perspective, including problem-, emotion-, and avoidance-coping forms. It was hypothesized that cognitive appraisals would mediate the relationship between the behavioral approach and inhibition systems and three coping forms. Undergraduate psychology students completed a battery of questionnaires assessing reinforcement sensitivity systems, cognitive appraisals, and coping behaviors. Regression analyses supported one of the hypotheses, indicating that cognitive appraisals mediate the relationship between the behavioral inhibition system and avoidance-coping behaviors. Exploratory analyses indicated that cognitive appraisals do no moderate the relationship between the systems and the three coping forms. However, sex served as a moderator in the relationship between the behavioral approach system and problem-focused coping behaviors. These results provide support for personality variables and sex in the coping process.

THE ROLES OF REINFORCEMENT SENSITIVITY AND COGNITIVE APPRAISALS IN PREDICTING COPING STRATEGIES

by

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CHAPTER I

INTRODUCTION

The stress and coping literature has grown tremendously since its inception approximately forty years ago. Although research has evaluated how a range of factors influence the stress and coping process, studies have only recently acknowledged the role of personality variables in predicting coping behaviors. One personality theory, in particular, the reinforcement sensitivity theory, provides a unique view of how biologically-based personality systems can affect cognitive appraisals of stressful events, and thus, coping behaviors. However, research has not evaluated how such underlying biological dimensions can serve as mechanisms for individual differences in cognitive and behavioral responses. Thus, this study aimed to determine how biologically-derived systems shape cognitive appraisals, and subsequently, the selection of coping strategies. Analyzing this process provides mental health professionals with a personality perspective to the stress and coping process and an account of how individuals select and use various coping strategies.

The Cognitive Theory of Psychological Stress and Coping

Although there are many theories that attempt to conceptualize the coping process, this study utilized Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping to understand coping differences. Not only is this theory one of the most commonly used conceptualizations in the stress and coping literature, but

a significant share of current coping research follows from this theory. This theory incorporates contextual factors in understanding the coping process, includes cognitive and behavioral attempts to deal with stress, and underscores the role of cognitive appraisal (Folkman & Moskowitz, 2004; Greer, 2007). Lazarus and Folkman's (1984) definition of coping has become widely accepted, and several subsequent theories resemble the original conceptualization of coping within two broad realms of problem- and emotion-focused forms (Folkman & Moskowitz, 2004; Tennen, Affleck, Armeli, & Carney, 2000). Since many of the components within Lazarus and Folkman's (1984) model drive stress and coping research, it seemed appropriate to apply this dominant theory in evaluating personality variables.

Lazarus and Folkman (1984) define psychological stress as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 19). This theory is "transactional in that the person and the environment are viewed as being in a dynamic, mutually reciprocal, bidirectional relationship" (Folkman, Lazarus, Gruen, & DeLongis, 1986, p. 572). Further, Lazarus and Folkman (1984) state that two processes, cognitive appraisal and coping, serve as "critical mediators of stressful person-environment relationships and immediate and long-term outcomes" (Folkman et al., 1986, p. 572). The first critical mediator, cognitive appraisal, is the process in which the person categorizes "an encounter, and its various facets, with respect to its significance for well-being" (Lazarus & Folkman, 1984, p. 31). Furthermore, this theory makes a distinction between primary appraisal and secondary appraisal. In primary appraisal, the

person evaluates whether the event is relevant to his or her well-being (Lazarus & Folkman, 1984). In secondary appraisal, the person determines what, if anything, can be done and examines the consequences of implementing various strategies (Lazarus & Folkman, 1984). In other words, in primary appraisal, the person considers, "Am I in trouble or being benefited, now or in the future, and in what way?" and in secondary appraisal, the person contemplates, "What if anything can be done about it?" (Lazarus & Folkman, 1984, p. 31). Primary and secondary appraisals converge to determine whether the person-environment transaction should be regarded as significant to one's well-being, and if so, whether the interaction is threatening or challenging and what can be done to manage the event. Thus, the cognitive appraisal process is an evaluative one that determines the extent to which a person-environment transaction is considered stressful (Lazarus & Folkman, 1984).

The second critical mediator, coping, follows the primary and secondary cognitive appraisals and involves the person's "cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141). Three main facets comprise this definition. First, coping is process-oriented, such that it concerns the person's actual thoughts and behaviors within a specific context and how this process changes throughout a stressful situation (Lazarus & Folkman, 1984). In addition, coping should be viewed within a context, such that the person's resources and appraisal of the actual demands in the encounter influence the coping process. Finally, this theory makes no assumptions about which coping forms are adaptive or maladaptive; coping refers to a

person's efforts to manage the stressor, regardless of mastery or outcome. Lazarus and Folkman (1984) also distinguish between two forms of coping. On the one hand, problem-focused coping aims to alter the situation causing the distress and involves active and deliberate attempts to deal with the stressor. Problem-focused forms of coping are more likely to occur when one appraises situations as amenable to change. On the other hand, emotion-focused coping attempts to regulate the emotional response to the stressor. Emotion-focused forms of coping are more probable when one appraises situations as though "nothing can be done to modify harmful, threatening, or challenging environmental conditions" (Lazarus & Folkman, 1984, p. 150). Therefore, Lazarus and Folkman (1984) conceptualize coping as two broad forms, one that involves active and deliberate attempts to deal with the stressor and another that aims to regulate emotions.

Even though these two forms are used extensively in the stress and coping literature, this coping conceptualization has received criticism (Skinner, Edge, Altman, & Sherwood, 2003). Several theorists believe that the distinction between problem-focused and emotion-focused coping does not capture the complexity of the coping process (Carver, Scheier, & Weintraub, 1989; Duhachek, 2005; Endler & Parker, 1990). Researchers have conducted principle components analyses with a measure that was devised to analyze the use of these two broad forms of coping with a current stressor (Folkman & Lazarus, 1985). In an attempt to differentiate coping categories more empirically, these researchers found a third basic dimension, avoidance-focused coping (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Vitaliano, Russo, Carr, Maiuro, & Becker, 1985). Furthermore, other studies have found avoidance as a factor

after using principle components analyses with other coping measures (Cosway, Endler, Sadler, & Deary, 2000; Endler & Parker, 1990; Endler & Parker, 1994; Hasking & Oei, 2002). This third dimension includes coping behaviors, such as withdrawal, escape, denial, and drug and alcohol use, which sometimes are considered forms of emotion-focused coping (Eaton & Bradley, 2008). Researchers evaluating the psychometric properties of three-dimensional coping measures, however, provide support for the separation of avoidance- and emotion-focused forms of coping (Cosway et al., 2000; Duhachek, 2005). In addition, Folkman and Moskowitz (2004) indicate that the distinction between emotion- and avoidance-focused strategies allows one to make finer distinctions in coping differences within an individual, rather than conceal them within broad categories. Finally, researchers analyzing experiential avoidance cite the coping styles literature to support the claim that this behavior is a separate form of coping (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Further, Hayes and colleagues (1996) state that many of the emotion-focused strategies presented in a commonly used coping measure (Folkman & Lazarus, 1985) contain an avoidance component, such as "refusing to think about disturbing events, supplanting bad thoughts with good ones, or looking at the bright side of things" (p. 1158). Based on previous research and theory mentioned here, this study defined avoidance coping as the removal from experiencing and/or thinking about a stressful situation and includes alcohol consumption and drug use (Britton, 2004; Carver et al., 1989; Folkman et al., 1986; Vitaliano et al., 1985). Therefore, this study viewed coping behaviors from a three-dimensional perspective, differentiating among problem-, emotion-, and avoidance-focused coping behaviors.

Study Specifications

Several specifications are drawn here in order to meet the confines of this study. First, coping differences were analyzed within young adulthood. Next, a stressful event was defined as any event between a "person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (Lazarus & Folkman, 1984, p. 19). Several examples of stressful events include hospitalization, death of a friend or family member, divorce, failing a course, and losing a job. Further, immediate and long-term outcomes of coping were not considered in this study. Finally, there are many socio-cultural variables, like ethnicity, sex, and socioeconomic status, which may influence the coping process. However, results regarding the roles of these variables and their interactions have been discrepant across studies (Eaton & Bradley, 2008; Plummer & Slane, 1996; Thompson, 2006). Given the ambiguity within this line of literature, the current study examined if underlying processes, like biologically-based personality dimensions, provide a more clear understanding of the stress and coping process. Therefore, this study evaluated personality variables that influence young adults' coping strategies with stressful events within Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping from a three-dimensional perspective.

Similar to Lazarus and Folkman's (1984) original conceptualization of the stress and coping process, the current study made no assumptions about which coping forms are adaptive or maladaptive across all situations. Most likely, the match with situational variables, especially controllability, predicts efficacy, rather than a problem-focused

approach, as once argued (Lam & McBride-Chang, 2007). For example, problem-focused strategies might be beneficial in controllable events, like studying for an exam, emotion-focused behaviors might be appropriate in uncontrollable situations, like a death of a family member, and avoidance-focused responses might be conducive in events that require distance, like neighborhood violence. The current study adopted the position that the ability to adjust coping responses to fit a range of particular stressors contributes to adaptation (Lam & McBride-Chang, 2007). Although this study did not examine immediate and long-term outcomes of particular coping strategies, personality characteristics may restrict one's appraisal and coping style, which poses implications for psychological outcomes. Therefore, this study aimed to evaluate how personality variables can predispose individuals to appraise events in consistent ways, and thus, to rely predominantly on specific coping forms. In order to assess the ways in which personality variables contribute to appraisal and coping patterns, the current study analyzed appraisals and coping behaviors across a range of situations, rather than responses to a specific situation (Delahaij, van Dam, Gaillard, & Soeters, 2011; Ptacek, Smith, Raffety, & Lindgren, 2008). Although the stress and coping process may depend on situational factors, this study analyzed general appraisal and coping patterns across time and situations to determine if particular personality variables predict predominant appraisal and coping styles.

Personality and Coping

Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping set a new course away from the original coping research which focused on ego-

psychology, defenses, and unconscious coping processes (Folkman & Moskowitz, 2004). Thus, this theory highlighted the role of cognitive appraisal and cognitive and behavioral responses to a range of stressors, as mentioned previously. However, in doing so, this theory also abandoned personality variables and adopted the view that such stable factors provide limited information regarding the complexity of coping behaviors and emotional responses to the specific demands of various stressors (Folkman & Lazarus, 1985; Folkman et al., 1986; Lazarus & Folkman, 1984). This position severely limited progress toward understanding the mechanisms that facilitate the use of coping strategies. Personality should not be overlooked, because it may restrict or aid the use of certain strategies and/or affect stress perceptions and exposure (Connor-Smith & Flachsbart, 2007; DeLongis & Holtzman, 2005; Hasking, 2006). Fortunately, in the past decade, there has been an influx in studies evaluating the influence of personality on coping. Although Lazarus and Folkman's (1984) theory provided an original contextual approach to the coping process, it neglected to observe how stable factors, like personality variables, affect the two central variables of the theory, cognitive appraisals and coping. Therefore, this study aimed to analyze how one set of personality variables influences cognitive appraisals and subsequent coping behaviors.

Reinforcement Sensitivity Theory

Reinforcement sensitivity theory (RST; Gray, 1970, 1991; Gray & McNaughton, 2000; McNaughton & Corr, 2004) is a biologically-based theory of personality that proposes that three neuropsychological systems underlie individual differences seen in reinforcement sensitivity, emotion, and psychopathology. Gray (1970) derived this theory

from Eysenck's arousal theory of extraversion (Eysenck, 1967), which compared introverts and extraverts in terms of their response thresholds and cortical arousal (Corr, 2004). Gray's theory changed the position of extraversion and neuroticism in factor space to account for punishment sensitivity, indicating anxiety, and for reward sensitivity, indicating impulsivity (Corr, 2004; Gray, 1970). Thus, RST became one of the first models to demonstrate the independence of two types of motivation (aversive and appetitive) and to link personality dimensions (anxiety and impulsivity) with these motivations (Torrubia, Avila, & Caseras, 2008). Recently, theorists have claimed that the roles of these neuropsychological systems have been oversimplified (Corr, 2008). Not only do they relate to motivations and personality dimensions, but they also serve as predisposing factors for a number of other behavioral functions (see below). Therefore, this theory describes underlying biological dimensions that possibly serve as mechanisms for individual differences in cognitive, affective, and behavioral responses.

Three systems of RST. This section describes the three neuropsychological systems proposed in RST: the behavioral approach system (BAS), the behavioral inhibition system (BIS), and the fight-flight-freeze system (FFFS). Then, this section evaluates how these systems relate to the cognitive theory of psychological stress and coping.

The BAS is sensitive to signals of reward and escape from punishment, motivates approach behavior in response to appetitive stimuli, and is associated with impulsivity (Corr, 2004). This system also initiates one's movement towards goals and is related to positive affect, including feelings of hope, elation, relief, and happiness (Pickering &

Gray, 1999). The major brain areas of the BAS are the basal ganglia, the dopamine system, and the motor, sensorimotor, and prefrontal cortices (Gray, 1994).

The BIS is sensitive to signals of punishment and novelty and has a bias for potentially aversive stimuli and information (McNaughton & Corr, 2004). This system also inhibits prepotent behavior, increases attention and arousal, and engages in risk assessment behaviors in order to resolve approach-avoidance conflicts (McNaughton & Corr, 2004; Mitchell, Kimbrel, Hundt, Cobb, Nelson-Gray, & Lootens, 2007). The behavioral inhibition system may lead to negative or painful outcomes and is responsible for feelings of anxiety, frustration, and sadness. The major brain areas of the BIS are the amygdala, the septo-hippocampal system, posterior cingulate, and the prefrontal dorsal stream (McNaughton & Corr, 2004).

The FFFS motivates avoidance and escape from aversive stimuli and is associated with fear and panic (Corr, 2004). The major brain areas of the FFFS are the amygdala, the anterior cingulate, and the prefrontal ventral stream (Gray & McNaughton, 2000; McNaughton & Corr, 2004). Corr (2004) hypothesized that BIS encompasses BIS and FFFS activation, so this study adopted this view as well.

Joint subsystems hypothesis. Most research with RST views the outlined systems as independent or as separable subsystems, such that reward responses are the same at all levels of BIS, and punishment responses are the same at all levels of BAS (Corr, 2001). However, Corr (2002) proposed the joint subsystems hypothesis (JSH), which indicates that BAS and BIS may be interdependent at times and have facilitatory or antagonistic effects on each other. On the one hand, more specifically, BAS facilitates and BIS

antagonizes BAS driven behaviors. On the other hand, BIS facilitates BIS driven behaviors, whereas BAS antagonizes these actions. Thus, individuals with high BAS sensitivity/low BIS sensitivity exhibit the strongest appetitive responses and positive affect (DePascalis, Arwari, Matteucci, & Mazzocco, 2005). In contrast, individuals with high BIS sensitivity/low BAS sensitivity demonstrate the most inhibition and negative affect. A range of study designs, including startle reflex paradigms, stop-signal tasks, and self-reported behaviors, provide evidence for the JSH (Corr, 2002; Corr, 2004; DePascalis et al., 2005; Knyazev & Wilson, 2004). Overall, Corr (2001) suggests that JSH complements, not opposes, Gray's (1970) original theory and provides a rationale for how RST subsystems may interact.

RST and coping behaviors. Even though RST could contribute to the stress and coping literature, there has been a dearth of research examining the direct relationship between the outlined biologically-based personality systems and coping behaviors (Carver & Connor-Smith, 2010).

A few studies have analyzed the role of coping strategies in the relationship between RST and substance use, eating behaviors, and/or delinquency. First, Colder and O'Connor (2002) evaluated how disinhibition influences alcohol use, specifically to enhance positive affect, rather than for social or coping motives. This study defined disinhibition as responsiveness to reward cues, a focus on reward-relevant information, and high expectations for reward outcomes, which is similar to BAS sensitivity (Colder & O'Connor, 2002). The results from laboratory tasks and self-reports suggest that alcohol use for enhancement reasons, but not for social or coping purposes, was related to

disinhibition. Thus, alcohol use for coping reasons may be more closely linked to inhibition (i.e., BIS) and/or emotion-focused drives. Another study examined the relationship between RST and attitudes toward eating and drinking behaviors (Hasking, 2006). Overall, BAS was positively correlated with problem solving strategies, while BIS was positively associated with the study's label of non-productive coping behaviors, including ignoring problems, self-blame, and wishful thinking. Further, the latter coping behaviors mediated the effect of BIS on eating disordered behaviors. A lack of problem solving strategies also predicted alcohol use. Similarly, in an evaluation of reinforcement sensitivity and delinquent behavior in adolescents, Hasking (2007) found that BAS was positively correlated with problem solving behaviors, and BIS was positively associated with the study's label of non-productive coping strategies. An additional study also found that BAS sensitivity predicted goal-directed actions in a behavioral task when under distress (Tull, Gratz, Latzman, Kimbrel, & Lejuez, 2010). Results from these studies suggest that BAS may predict problem-solving efforts during stress; whereas BIS may predict coping behaviors aimed to regulate emotional responses and/or remove oneself from the stressor, including alcohol use for coping reasons. However, these studies did not specifically evaluate how BAS and BIS directly influence the use of various coping strategies, so the present study sought to evaluate this relationship.

Previous research related to BAS and BIS behaviors can provide a useful backdrop for understanding the relationship between RST and coping patterns. In laboratory settings, BAS predicts reward seeking behavior and risky behavior, and BIS predicts avoidant behavior and behavioral inhibition (Carver & White, 1994;

Kambouropoulos & Staiger, 2004). Some studies have found that in daily life BAS and BIS predict positive events and social avoidance, respectively (Gable, Reis, & Elliot, 2000; Meyer, Olivier, & Roth, 2005). A recent study examined BAS, BIS, and daily behaviors in an undergraduate sample and found that BAS sensitivity predicted social activity and risky behaviors, whereas BIS sensitivity predicted withdrawal (Hundt, Shah, Mitchell, Kimbel, & Nelson-Gray, 2008). Further, in a study exploring the relationship between RST systems and another personality theory (Costa & McCrae, 1992), achievement striving was a positive predictor of BAS; whereas vulnerability predicted BIS (Mitchell et al., 2007). These results suggest that BAS is associated with achievement and goal-directed behaviors, and BIS is related to sensitivity to criticism and threat. Therefore, previous research regarding RST systems and everyday behaviors indicates how BAS and BIS might influence coping responses to stress.

Given that BAS has been consistently associated with approach tendencies, reward, and goal resolution, BAS should predict coping responses that facilitate such goals and tendencies, namely, problem-focused strategies. Although BAS has been linked to substance use and risky behaviors, it appears as though individuals engage in these acts for enhancement reasons, rather than for coping purposes (Colder & O'Connor, 2002). Thus, in the face of stressors, BAS sensitivity should predict strategies that will lead one to approach and confront stress, seek reward, and complete goals (Derryberry, Reed, & Pilkenton-Taylor, 2003). In accordance with the JSH, high BAS sensitivity, coupled with low BIS sensitivity, should predict the most use of problem-focused forms of coping. Since BIS has a vulnerability to distress and has been associated with emotion-focused

coping efforts in previous research, BIS should predict coping behaviors that seek to minimize negative emotions, namely, emotion-focused strategies (Derryberry et al., 2003). Further, given that BIS has been consistently associated with avoidance, withdrawal, and a bias for threatening information, BIS sensitivity should also predict coping behaviors that seek to avoid perceived threats, namely, avoidance-focused strategies (Derryberry et al., 2003). Finally, consistent with the JSH, high BIS, coupled with low BAS, should predict the most use of emotion- and avoidance-focused forms of coping. Thus, BIS sensitivity was hypothesized to predict both emotion- and avoidance-focused coping behaviors, but for different reasons, to minimize negative emotions and avoid perceived threats, respectively. Since the current study did not evaluate different situations, intentions, or outcomes, no specific claims were made regarding the use of these coping forms between events; rather, the study sought to determine if BIS predicted both emotion- and avoidance-focused coping in general.

RST and cognitive appraisals. Research provides preliminary evidence that dispositional traits, like hardiness, optimism, and hostility, contribute to the stability of appraisals across situations (Power & Hill, 2010). Given that BAS and BIS are biological predispositions that affect behavior, then they might also involve cognitive processes and influence both the primary and secondary appraisal stages in the coping process (Derryberry et al., 2003; Hasking, 2006; Smillie, 2008). Thus, it is imperative to review how these predispositions influence such appraisals.

Lazarus and Folkman (1984) propose that primary and secondary appraisals interact in shaping the degree of perceived stress in person-environment encounters.

Lazarus and Folkman also suggest that although primary and secondary appraisals are theoretically distinct, in reality, they are interdependent and influence each other. Given this interplay, one strategy for assessing both cognitive appraisal processes utilizes a global measure of overall perceived stress (Cohen, Kamarck, & Mermelstein, 1983). This approach reveals the degree to which events are appraised as stressful, with higher levels of stress reflecting interpretations that events are threatening, uncontrollable, and unpredictable. Further, this method allows researchers to test how the experienced level of stress is a function of other variables, like personality factors, and is useful when the main research question involves appraised stress, as opposed to an objective measure of stressful life events (Cohen et al., 1983; Cohen & Williamson, 1988). Thus, the current study conceptualized cognitive appraisals as a global measure of perceived stress.

Lazarus and Folkman (1984) indicate that three main stress appraisals exist in the primary appraisal phase: harm/loss, threat, and challenge. BAS sensitivity may foster an interpretation that stressful person-environment events are challenges due to the underlying sensitivity to reward stimuli and the omission of punishment (Corr, 2008). Further, the movement toward goals, coupled with positive affect, motivates approach behaviors and leads to appraisals of less stress. According to the JSH, high BAS sensitivity/low BIS sensitivity may lead to the most challenge appraisals, and thus, the least perceived stress, due to appetitive responses and positive affect with limited sensitivity to novelty and punishment. BIS sensitivity may lead one to regard stressful person-environment encounters as potential harms or threats due to the underlying sensitivity to novelty and signals of punishment (Corr, 2008). One may be less likely to

view encounters as challenges, because such appraisals require approach behavior and mobilization of resources to meet goals. Rather, BIS sensitivity promotes inhibition of behavior and avoidance. One study analyzed how BAS and BIS sensitivities predicted perceived work-related stress under high and low demand conditions (Van Der Linden, Beckers, & Taris, 2007). This study found that BIS sensitivity predicted greater perceived stress, regardless if the environmental demands were high or low, but BAS sensitivity was unrelated to perceived stress. Finally, high BIS sensitivity/low BAS sensitivity may lead to the most harm or threat appraisals, and thus, the greatest perceived stress, due to the sensitivity to novelty and punishment with limited reward responsiveness and goal motivation.

In secondary appraisal, the person determines what can be done and examines the consequences of implementing various strategies (Lazarus & Folkman, 1984). BAS sensitivity may lead to an evaluation of many coping strategies and may predict appraisals that there are minimal negative consequences for implementing various strategies due to the active pursuit of desired goals and positive affect associated with the pursuit and attainment of incentives (Carver & White, 1994). In other words, BAS sensitivity may lead one to view events as controllable, amenable to change, and less stressful. High BAS sensitivity/low BIS sensitivity may lead to the most appraisals that situations are controllable, because high BAS promotes these interpretations. In contrast, BIS sensitivity may foster appraisals that little to nothing can be done to change person-environment encounters and that there is a potential for negative consequences upon implementing strategies, leading to greater stress levels. The system's bias for potentially

threatening information and inhibition of behavior may contribute to these appraisals. Further, low BIS suggests a lower level of sensitivity to punishment and possibly threatening information. High BIS sensitivity/low BAS sensitivity may lead to the most appraisals that situations are uncontrollable and negative, because high BIS promotes these interpretations, and low BAS suggests a lower level of pursuit and attainment of goals and rewards.

Following from the claims outlined above, BAS may lead to the least, and BIS may lead to the most cognitive appraisals of perceived stress, due to their underlying sensitivities to reward and punishment, respectively. Research has not evaluated how BAS and BIS contribute directly to cognitive appraisals of the coping process. Research has analyzed how appraisals predict various coping behaviors. Given that such results provide important information about how BAS and BIS influence coping strategies, possibly through cognitive appraisals of perceived stress, these results are described next.

Cognitive appraisals and coping behaviors. The stress and coping literature has consistently demonstrated that cognitive appraisals predict coping strategies. More specifically, research indicates that when individuals appraise situations as challenging, changeable, and less stressful, they are more likely to use strategies associated with problem-focused coping, like confrontive coping, planful problem-solving, and positive reappraisal (Folkman et al., 1986; Gan, Anshel, & Kim, 2009; Newton & McIntosh, 2010; Ptacek, Smith, & Zanas, 1992; Ramirez-Maestre, Esteve, & Lopez, 2008; Roesch & Weiner, 2001). However, when events are considered threatening, uncontrollable, and overly stressful, individuals utilize strategies associated with emotion- and avoidance-

focused forms of coping, like venting emotions, distancing, and escape-avoidance (Bouchard, 2003; Eaton & Bradley, 2008; Folkman et al., 1986; Gan et al., 2009; Newton & McIntosh, 2010; Ptacek et al., 1992; Ramirez-Maestre et al., 2008; Roesch & Weiner, 2001). Given these results, it would seem appropriate to hypothesize that BAS sensitivity would indirectly predict problem-focused coping due to challenge, control, and minimal stress appraisals, whereas BIS sensitivity would indirectly lead to emotion- and avoidance-focused forms of coping through appraisals of threat, uncontrollability, and high levels of stress. High BAS sensitivity/low BIS sensitivity and high BIS sensitivity/low BAS sensitivity would also demonstrate the strongest effects for problem-focused and emotion- and avoidance-focused coping due to the antagonistic roles of BIS and BAS, respectively.

The Influence of Reinforcement Sensitivities on Coping Behaviors

RST may serve a critical role in influencing cognitive appraisals and coping behaviors, given its focus on biologically-based personality systems and their contributions to individual differences. The proposed model suggests that cognitive appraisals mediate the relationship between BAS, BIS, and the BIS/BAS interaction and coping behaviors (see Figure 1).

Based on previous research and these reinforcement systems' sensitivities, BAS predicts problem-focused coping strategies, because of its approach tendencies, responses to reward, and goal resolution. Further, BIS predicts emotion-focused coping behaviors, because this system seeks to regulate emotional responses, and avoidance-focused coping forms to avoid perceived threats. Also, low BIS exacerbates the effect of BAS sensitivity

in predicting problem-focused strategies, and low BAS intensifies the effect of BIS sensitivity in producing emotion- and avoidance coping behaviors.

Cognitive appraisals explain how these systems lead to various coping behaviors. More specifically, BAS sensitivity, with its underlying goal attainment and approach tendencies, predicts appraisals associated with challenge and controllability, and thus, less perceived stress. Such appraisals then lead to coping behaviors related to problem-focused strategies. In line with the JSH, this path is the strongest with low BIS sensitivity. In contrast, BIS sensitivity predicts appraisals associated with uncontrollable harms or threats, and thus, more perceived stress, because the system has a sensitivity to punishment, a bias for potentially threatening stimuli, and an engagement in risk assessment behaviors. Further, these appraisals contribute to the use of emotion- and avoidance-focused forms of coping. According to the JSH, this relationship is strongest with low BAS sensitivity.

The appraisals and coping forms described here are not considered adaptive or maladaptive in and of themselves. Rather, an inflexible appraisal approach, and thus, a limited coping repertoire are considered maladaptive (Folkman & Moskowitz, 2004). BAS and/or BIS sensitivity may restrict one's appraisal and coping style, which poses implications for psychological outcomes. Although this study did not analyze immediate and long-term outcomes of the coping process, an evaluation of this model can determine how BAS and BIS predispose people to cope in certain ways through the influence of cognitive appraisals.

Statement of Purpose

Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping highlights the roles of two critical variables, cognitive appraisals and coping, in conceptualizing the relationship between stressful encounters and outcomes. However, this theory does not account for the role of personality variables in influencing cognitive appraisals and coping. Gray's (1970) RST provides a biological theory of personality that explains how reinforcement sensitivity systems underlie individual differences in cognitive and behavioral responses. Thus, these systems can be applied to the stress and coping process, given that they may predispose individuals to appraise and cope with situations in predominant ways. This study does not assess variability in coping in response to differing situations, nor does it assess the effectiveness of various coping strategies in response to differing situations.

The current study aimed to examine how cognitive appraisals mediate the relationship between RST systems and various coping patterns. Previous research suggests that BAS and BIS predict problem-focused and emotion- and avoidance-focused forms of coping, respectively. Further, cognitive appraisals may serve as a mechanism through which BAS and BIS lead to these coping strategies. However, research has not evaluated how RST systems directly predict cognitive appraisals. Given the role of cognitive appraisals in the stress and coping process, it is appropriate to determine how BAS and BIS influence the appraisal process, and thus, coping patterns. The proposed model (see Figure 1) explains: (1) how predisposing factors, like BAS and BIS, can

influence the appraisal and coping process, and (2) how cognitive appraisals mediate the relationship between these personality systems and coping behaviors.

Following from previous research and theories, the following hypotheses were proposed.

Hypotheses

1. Cognitive appraisals that situations are challenging and controllable, as evidenced by less perceived stress, would mediate the relationship between BAS and problem-focused coping strategies.
    a. High BAS sensitivity/low BIS sensitivity would predict the least cognitive appraisals of perceived stress, and thus, the greatest use of problem-focused coping strategies.
2. Cognitive appraisals that situations are threatening and uncontrollable, as evidenced by high perceived stress, would mediate the relationship between BIS and emotion-focused coping strategies.
    a. High BIS sensitivity/low BAS sensitivity would predict the most cognitive appraisals of perceived stress, and thus, the greatest use of emotion-focused coping strategies.
3. Cognitive appraisals that situations are threatening and uncontrollable, as evidenced by high perceived stress, would mediate the relationship between BIS and avoidance-focused coping strategies.

a. High BIS sensitivity/low BAS sensitivity would predict the most cognitive appraisals of perceived stress, and thus, the greatest use of avoidance-focused coping strategies.

CHAPTER II

METHOD

Participants

Two-hundred and eighty undergraduate students enrolled in an introductory psychology course at the University of North Carolina at Greensboro participated as part of a course requirement. Students were not selected on any study-related criterion and registered for the study through Experimetrix, a web-based experiment scheduling program. Twenty-three participants (approximately 8%) scored above the recommended cut-off score of three or higher on the Infrequency Scale (IFS; Chapman & Chapman, 1986), which suggests that it is likely these participants used a random response style while completing the questionnaires. Thus, these participants were excluded from all statistical analyses. Further, fifteen participants (approximately 5%) had more than five percent missing data, so these participants were also excluded from all statistical analyses. This yielded a final sample of 242 participants. Participants were 18 years of age or older. The participants' mean age was 19 years (SD = 2.7). Approximately seventy-two percent of the sample was female, and approximately sixty-three percent of the sample was Caucasian, both of which were consistent with the University's demographic profile. No students were excluded from the study on the basis of sex or ethnicity. Table 1 provides a summary of the participants' demographic information.

Materials

Demographics. Participants completed a short form with demographic information, including name, age, sex, contact information (email, phone number), marital status, ethnicity, and family household annual income (if known). (See Appendix A)

Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ). The SPSRQ (Torrubia, Avila, & Molto, 2001) is a 48-item self-report measure that assesses sensitivity to punishment (SP; 24 items) and sensitivity to reward (SR; 24 items), or BIS and BAS, respectively. Items are presented in a 'yes-no' format. Adding all 'yes' responses for each scale derives a total scale score that ranges from 0 to 24. Previous research using this measure suggests that the SP scale has good internal consistency reliability for males and females ($\alpha = .83$ and $\alpha = .83$, respectively), and the SR scale has acceptable internal consistency reliability for males and females ($\alpha = .78$ and $\alpha = .75$, respectively; Torrubia et al., 2001). Previous research also reports that the scales have good test-retest reliability and good construct validity (Torrubia et al., 2001). (See Appendix B)

Infrequency Scale for Personality Measures (IFS). The IFS (Chapman & Chapman, 1986) is a 13-item scale that is used to determine random responding and contains statements that are unusual or infrequent in nature. This scale was embedded in the SPSRQ. Participants who endorsed three or more items on the IFS were excluded from the final statistical analyses. (See Appendix B)

Perceived Stress Scale (PSS). The PSS (Cohen & Williamson, 1988) is a 10-item self-report measure that assesses the degree to which one appraises events during the last month as stressful. The items are presented in a 5-point Likert scale, with '0' indicating 'never' and '4' indicating 'very often.' A total score can be obtained by reverse scoring four items and then summing across all ten items, for a range of 0 to 40. Higher scores suggest appraisals that are more threatening, uncontrollable, unpredictable, and more overall perceived stress; whereas lower scores suggest less overall perceived stress. The current study utilized this global perceived stress score to measure cognitive appraisals and will be labeled as cognitive appraisals throughout this document. According to the original construction of the PSS and previous research, the PSS has good internal consistency reliability, with α ranging from .84 to .86, as well as good construct validity (Cohen et al., 1983; Corcoran & Fisher, 2000). (See Appendix C)

The COPE Inventory (COPE). The COPE (Carver, Scheier, & Weintraub, 1989) is a 49-item self-report measure that assesses the use of various coping strategies in response to stress. Participants indicate the degree to which they used the coping strategies under stress in the last month. The COPE includes 14 subscales, including active coping, planning, suppression of competing activities, restraint coping, seeking social support for instrumental reasons, seeking social support for emotional reasons, positive reinterpretation and growth, acceptance, turning to religion, focus on and venting of emotions, denial, behavioral disengagement, mental disengagement, and alcohol-drug disengagement. Each subscale includes two to four items. The items are presented in a 4-point Likert scale, from '1' ("I usually don't do this at all") to '4' ("I usually do this a

lot"). Scores are determined by summing the ratings for all items on each subscale. A recent confirmatory factor analysis suggests that these subscales load onto three higher order factors, problem/task, emotion, and avoidance coping, and have good fit indices (Hasking & Oei, 2002). Thus, the subscale scores were summed to create three total scores, one for each higher order factor, with a range of 21 to 84 for problem/task coping, 9 to 36 for emotion coping, and 20 to 80 for avoidance coping. Active coping, planning, suppression of competing activities, restraint coping, seeking social support for instrumental reasons, and seeking social support for emotional reasons load onto the problem/task coping factor. Positive reinterpretation and growth, acceptance, and focus on and venting of emotions load onto the emotion coping factor. Denial, behavioral disengagement, mental disengagement, turning to religion, and alcohol-drug disengagement load onto the avoidance coping factor. Previous research notes that the subscales have low to good internal consistency reliability, with α ranging from .45 to .92, as well as good convergent and discriminant validity (Carver et al., 1989; Hasking & Oei, 2002). (See Appendix D)

Procedure

An undergraduate research assistant served as the experimenter for all study sessions. The experimenter offered participants an opportunity to ask questions about the nature of the study. After signing a consent form, participants completed the measures during a two-hour period. They completed the measures in groups, ranging in size from one participant to twenty-five. The measures were presented in random order, and

participants were allowed to take a break while completing the measures to ensure that they were not fatigued.

CHAPTER III

RESULTS

Preliminary Statistical Analyses

Means, standard deviations, and Cronbach's coefficient alphas were determined for the six study variables, BAS sensitivity, BIS sensitivity, cognitive appraisals (PSS total score), and problem-focused, emotion-focused, and avoidance-focused coping. As seen in Table 2, the internal consistency for the scales ranged from .74 (emotion-focused coping scale) to .89 (problem-focused coping scale), which indicates that the internal consistency reliability for the scales employed in the current study ranged from acceptable to good (Green & Salkind, 2008). All six study variables were also normally distributed in this sample. The alpha level for all analyses was set at .05.

Zero-order Pearson correlations were also determined among the six study variables and presented in a correlation matrix in Table 3. BAS sensitivity was correlated positively with avoidance-focused coping, yet was unrelated to cognitive appraisals and problem- and emotion-focused coping. BIS sensitivity was correlated positively with cognitive appraisals and avoidance-focused coping, yet was unrelated to problem- and emotion-focused coping. Further, BAS and BIS sensitivities were unrelated to one another. Cognitive appraisals were correlated positively with emotion- and avoidance-focused coping. All coping variables were correlated positively with one another.

Mediation Models

Data were analyzed according to Baron and Kenny's (1986) statistical recommendations for testing mediation. Three sets of hierarchical multiple regression analyses, one set for each criterion variable, were performed to test the conditions required for mediation. Prior to conducting the regression analyses, the BAS and BIS sensitivity variables were centered. First, the criterion variable (problem-, emotion-, or avoidance-focused coping) was regressed on the predictor variable (BAS, BIS, and the two-way interaction of BAS and BIS). If there was a significant effect of the predictor on the criterion, then the mediator (cognitive appraisals) was regressed onto the predictor. If there was a significant effect of the predictor on the mediator, then the criterion variable was regressed on the mediator with the predictor in the model.

Age, sex, family income, and ethnicity were entered in the first step of all hierarchical multiple regression analyses in order to determine the effects of the predictors over and above demographic variables. The ethnicity variable was dummy coded, creating six new variables. All six were entered into the first step of each regression analysis; the variables were not significant in any analyses. All analyses were also conducted with the ethnicity variable dually coded as Caucasians and non-Caucasians; the variables were not significant in any analyses. As stated earlier, BIS and BAS were not significantly correlated. However, to ensure independent effects, BIS and BAS were entered together in the second step of all hierarchical multiple regression analyses, except one analysis.

Problem-focused coping. The problem-focused coping score was regressed onto BAS, BIS, and the interaction of BAS and BIS to establish that there were total effects of BAS and the interaction of BAS and BIS on problem-focused coping. Sex, ethnicity dummy variables, age, and family income were entered in the first step. BAS and BIS were entered in the second step. Finally, the interaction of BAS and BIS was entered in the third step. Problem-focused coping was entered as the criterion variable. The overall model approached significance, F (12, 221) = 1.788, p = .051, and accounted for 8.9% of the variance in problem-focused coping (see Table 4). BAS did not have a significant main effect. In the third step of the model, the interaction of BAS and BIS was significant (β =.14, p < .05). A simple slopes analysis (Aiken & West, 1996) indicated that BAS interacted with BIS, such that high BAS sensitivity, coupled with high BIS sensitivity, resulted in more problem-focused coping strategies (see Figure 2). However, low BAS sensitivity, coupled with high BIS sensitivity, led to the least use problem-focused coping strategies.

Since the interaction of BAS and BIS had a significant effect on the criterion variable of problem-focused coping, the cognitive appraisals variable was regressed onto the BAS and BIS interaction (while controlling for BAS and BIS alone) to establish that there was an effect of the BAS and BIS interaction on cognitive appraisals, the mediator. Sex, ethnicity dummy variables, age, and family income were entered in the first step. BAS and BIS were entered in the second step. Finally, the interaction of BAS and BIS was entered in the third step. The cognitive appraisals variable was entered as the criterion variable. The overall model was significant, F (12, 221) = 8.060, p < .01, and

accounted for 30.4% of the variance in cognitive appraisals (see Table 5). The interaction of BAS and BIS did not predict cognitive appraisals. However, sex (β =.15, p < .05) and BIS (β =.49, p < .01) had significant main effects. Specifically, the female sex and BIS sensitivity predicted more cognitive appraisals of perceived stress.

Since BAS did not predict problem-focused coping and the interaction of BAS and BIS did not predict cognitive appraisals (see Figure 3), additional analyses were not conducted to test the first hypothesis, the mediation of cognitive appraisals in the relationship between BAS and the interaction of BAS and BIS and problem-focused coping behaviors.

Emotion-focused coping. The emotion-focused coping score was regressed onto BIS, BAS, and the interaction of BIS and BAS to establish that there were total effects of BIS and the interaction of BIS and BAS on emotion-focused coping. Sex, ethnicity dummy variables, age, and family income were entered in the first step. BIS and BAS were entered in the second step. Finally, the interaction of BIS and BAS was entered in the third step. Emotion-focused coping was entered as the criterion variable. The overall model was significant, F (12, 221) = 2.700, p < .01, and accounted for 12.8% of the variance in emotion-focused coping (see Table 6). Neither BIS nor the interaction of BIS and BAS had significant effects on emotion-focused coping. However, sex (β =.29, p < .01) and BAS (β =.15, p < .05) had significant main effects. Specifically, the female sex and BAS sensitivity predicted the use of emotion-focused coping behaviors.

Since neither BIS nor the interaction of BIS and BAS predicted emotion-focused coping (see Figure 4), additional analyses were not conducted to test the second

hypothesis, the mediation of cognitive appraisals in the relationship between BIS and the interaction of BIS and BAS and emotion-focused coping behaviors.

Avoidance-focused coping. The avoidance-focused coping score was regressed onto BIS, BAS, and the interaction of BIS and BAS to establish that there were total effects of BIS and the interaction of BIS and BAS on avoidance-focused coping. Sex, ethnicity dummy variables, age, and family income were entered in the first step. BIS and BAS were entered in the second step. Finally, the interaction of BIS and BAS was entered in the third step. Avoidance-focused coping was entered as the criterion variable. The overall model was significant, F (12, 221) = 2.869, $p < .01$, and accounted for 13.5% of the variance in avoidance-focused coping (see Table 7). BIS (β =.22, $p < .01$) and BAS (β =.19, $p < .01$) had significant main effects. However, the interaction of BIS and BAS did not have a significant effect on avoidance-focused coping.

Since BIS had a significant effect on the criterion variable of avoidance-focused coping, the cognitive appraisals variable was regressed onto BIS to establish that there was an effect of BIS on cognitive appraisals, the mediator. Sex, ethnicity dummy variables, age, and family income were entered in the first step. BIS and BAS were entered in the second step. The cognitive appraisals variable was entered as the criterion variable. The overall model was significant, F (12, 221) = 8.832, $p < .01$, and accounted for 30.4% of the variance in cognitive appraisals (see Table 8). BIS (β =.49, $p < .01$) and sex (β =.15, $p < .05$) had significant main effects with the female sex and BIS sensitivity predicting more cognitive appraisals of perceived stress.

Finally, since BIS had a significant effect on the mediator of cognitive appraisals, avoidance-focused coping was regressed onto the cognitive appraisals variable with BIS in the model to establish that there was an effect of cognitive appraisals on avoidance-focused coping. Sex, ethnicity dummy variables, age, and family income were entered in the first step. BAS was entered in the second step. BIS and cognitive appraisals were entered in the third step. Avoidance-focused coping was entered as the criterion variable. The overall model was significant, F (12, 221) = 3.443, $p < .01$, and accounted for 15.7% of the variance in avoidance-focused coping (see Table 9). Cognitive appraisals (β =.20, $p < .01$) and BAS (β =.18, $p < .01$) had significant main effects. Further, BIS (β =.13, $p > .05$) did not have a significant effect on avoidance-focused coping with the mediator in the model. This result suggests that cognitive appraisals fully mediate the relationship between BIS and avoidance-focused coping (see Figure 5).

Exploratory Analyses

The second hypothesis proposed that cognitive appraisals would mediate the relationship between BIS and the interaction of BIS and BAS and emotion-focused coping behaviors. Neither BIS, nor the interaction of BIS and BAS, predicted emotion-focused coping. As seen in Table 6, BAS (β =.15, $p < .05$) had a significant main effect. Given this result, the effect of BAS on cognitive appraisals was evaluated (see Table 8). BAS (β =.08, $p > .05$) did not predict cognitive appraisals, which suggests that BAS predicts emotion-focused coping strategies, but cognitive appraisals do not serve a mediation role in this relationship.

Moderation. Additional analyses were also conducted to determine if cognitive appraisals of perceived stress moderate the relationship between BIS and BAS and various coping strategies. For example, BAS sensitivity and cognitive appraisals were not related, and cognitive appraisals did not mediate the relationship between BAS sensitivity and problem-focused coping. Given these results, it may be that cognitive appraisals moderate, rather than mediate, the effect of BAS on coping behaviors. Further, cognitive appraisals of perceived stress may moderate the relationship between BIS and problem- and emotion-focused coping behaviors. The following results should be interpreted with caution, given that they were conducted post-hoc.

Three hierarchical multiple regression analyses, one set for each criterion variable, were performed to determine if cognitive appraisals moderate the relationship between BAS and coping behaviors. Prior to conducting the regression analyses, the cognitive appraisals (perceived stress) variable was centered. Sex, ethnicity dummy variables, age, and family income were entered in the first step of all hierarchical multiple regression analyses in order to determine the effects of the predictors over and above demographic variables. BIS and BAS were entered together in the second step of all hierarchical multiple regression analyses. The cognitive appraisals variable was entered in the third step, followed by the interaction of BAS and cognitive appraisals and the interaction of BIS and cognitive appraisals in the fourth step.

In the first analysis problem-focused coping was entered as the criterion variable. The overall model was significant, F (14, 219) = 1.781, $p < .05$, and accounted for 10.2% of the variance in problem-focused coping (see Table 10). Neither the interaction of BAS

and cognitive appraisals nor the interaction of BIS and cognitive appraisals had significant effects on problem-focused coping. However, sex (β =.16, $p < .05$), BAS (β =.15, $p < .05$), BIS (β =.16, $p < .05$), and cognitive appraisals (β = -.16, $p < .05$) had significant main effects. Specifically, the female sex, BAS sensitivity, BIS sensitivity, and lower cognitive appraisals of perceived stress predicted the use of problem-focused coping behaviors.

In the second analysis emotion-focused coping was entered as the criterion variable. The overall model was significant, F (14, 219) = 2.815, $p < .01$, and accounted for 15.3% of the variance in emotion-focused coping (see Table 11). Neither the interaction of BAS and cognitive appraisals nor the interaction of BIS and cognitive appraisals had significant effects on emotion-focused coping. However, sex (β =.26, $p <$ .01), BAS (β =.14, $p < .05$), and cognitive appraisals (β = .17, $p < .05$) had significant main effects. Specifically, the female sex, BAS sensitivity, and greater cognitive appraisals of perceived stress predicted the use of emotion-focused coping behaviors.

In the third analysis avoidance-focused coping was entered as the criterion variable. The overall model was significant, F (14, 219) = 3.176, $p < .01$, and accounted for 16.9% of the variance in avoidance-focused coping (see Table 12). Neither the interaction of BAS and cognitive appraisals nor the interaction of BIS and cognitive appraisals had significant effects on avoidance-focused coping. However, BAS (β =.18, $p < .01$) and cognitive appraisals (β = .21, $p < .01$) had significant main effects. Specifically, BAS sensitivity and greater cognitive appraisals of perceived stress predicted the use of avoidance-focused coping behaviors.

Sex. In two models sex had a significant main effect, with the female sex predicting more cognitive appraisals of perceived stress (see Tables 5 and 8). An independent samples t test was conducted to evaluate further sex differences in cognitive appraisals of perceived stress. The test was significant, $t(240) = -3.45$, $p < .01$, such that females ($M = 21.63$, $SD = 7.46$) reported more cognitive appraisals of perceived stress than males ($M = 18.03$, $SD = 6.83$). Given this result, independent samples t tests were also conducted to examine sex differences in the activation of RST systems. These tests were significant, $t(240) = 2.84$, $p < .01$ and $t(240) = -2.52$, $p < .01$, indicating that males ($M = 12.67$, $SD = 4.31$) reported higher BAS sensitivity than females ($M = 10.91$, $SD = 4.28$) and that females ($M = 12.89$, $SD = 5.36$) reported higher BIS sensitivity than males ($M = 10.93$, $SD = 5.65$). Thus, females reported higher BIS sensitivity and perceived stress; whereas males reported higher BAS sensitivity and less perceived stress.

Given the number of sex differences, additional analyses were conducted to determine if sex moderates the relationship between reinforcement sensitivity systems and coping behaviors. Three hierarchical multiple regression analyses, one set for each criterion variable, were performed. These analyses were conducted, as opposed to performing analyses separately for males and females, in order to maintain sufficient power. Sex, ethnicity dummy variables, age, and family income were entered in the first step of all hierarchical multiple regression analyses in order to determine the effects of the predictors over and above demographic variables. BIS and BAS were entered together in the second step of all hierarchical multiple regression analyses. Finally, the interaction of BAS and sex and the interaction of BIS and sex were entered in the third

step. The following results should be interpreted with caution, given that they were conducted post-hoc.

In the first analysis problem-focused coping was entered as the criterion variable. The overall model was significant, F (13, 220) = 1.974, $p < .05$, and accounted for 10.4% of the variance in problem-focused coping (see Table 13). Family income (β =.15, $p <$ .05) and BAS (β = -.59, $p < .05$) had significant main effects. Specifically, higher family income and less BAS sensitivity predicted the use of problem-focused coping behaviors. In the third step of the model, the interaction of BAS and sex was significant (β =.74, $p <$ .01). A simple slopes analysis (Aiken & West, 1996) indicated that females with high BAS sensitivity reported greater use of problem-focused coping strategies, whereas males with high BAS sensitivity reported less use of such strategies (Figure 6). Females with low BAS sensitivity reported engaging in less problem-focused coping efforts, compared to males with low BAS sensitivity.

In the second analysis emotion-focused coping was entered as the criterion variable. The overall model was significant, F (13, 220) = 2.573, $p < .01$, and accounted for 13.2% of the variance in emotion-focused coping (see Table 14). Neither the interaction of BAS and sex nor the interaction of BIS and sex had significant effects on emotion-focused coping. However, sex (β =.28, $p < .01$) had a significant main effect, such that the female sex predicted the use of emotion-focused coping behaviors.

In the third analysis avoidance-focused coping was entered as the criterion variable. The overall model was significant, F (13, 220) = 2.637, $p < .01$, and accounted for 13.5% of the variance in avoidance-focused coping (see Table 15). Neither the

interaction of BAS and sex nor the interaction of BIS and sex had significant effects on avoidance-focused coping. Further, there were no significant main effects within the overall model.

CHAPTER IV

DISCUSSION

The current study aimed to determine how predisposing personality factors, namely, BAS and BIS, influence the appraisal and coping process and to test the mediating role of cognitive appraisals in the relationship between personality and coping behaviors.

Following from the first hypothesis, BAS alone did not predict problem-focused coping behaviors, yet, surprisingly, the interaction of high BAS sensitivity and high BIS sensitivity predicted these strategies. This finding indicates that BAS sensitivity predicts problem-solving efforts and goal-directed behaviors under stress, yet only when coupled with high BIS sensitivity. The tendencies for risk assessment and the bias for potentially aversive stimuli associated with BIS sensitivity may provide increased motivation to seek resolution to stressors, contributing to task-oriented efforts (Bolger, 1990; McNaughton & Corr, 2004, 2008a). Although BAS sensitivity has been associated with impulsivity, it appears as though BIS sensitivity may impose a brake on impulsive behaviors, constrain appetitive motivation, heighten behavioral restraint, and allow for the implementation of planful and problem-focused coping behaviors (Corr, 2002, 2008; Derryberry et al., 2003). Conversely, low BAS sensitivity, coupled with high BIS sensitivity, led to the least use of problem-focused coping strategies, suggesting that problem-focused coping behaviors are less likely to be utilized when the approach and goal resolution tendencies

associated with BAS sensitivity are less active. Given that the results did not support the mediation of cognitive appraisals, individuals may focus more attention on the necessary steps to achieve goals and relieve stress while engaging in problem-solving efforts, rather than concentrating on perceived challenge and/or controllability in an event.

Contrary to the second hypothesis, neither BIS nor the interaction of BIS and BAS predicted emotion-focused coping strategies. These results suggest that BIS sensitivity is not associated with emotion-focused coping efforts, but rather, with coping behaviors related to disengagement and avoidance (see below). In a recent meta-analysis, Connor-Smith and Flachsbart (2007) found that behavioral inhibition was unrelated to emotion-focused coping and social support and negatively associated with cognitive restructuring and acceptance. In addition, Tull and colleagues (2010) found that BIS sensitivity significantly predicted difficulties in regulating emotional responses to stressors in a community population. Although the current study hypothesized that BIS sensitivity would predict efforts aimed to relieve negative emotions, it appears as though avoidance-focused coping strategies, as opposed to emotion-focused coping forms, are utilized to relieve distress and manage perceived threats. Finally, BAS predicted emotion-focused strategies, which was surprising, given that BAS sensitivity has consistently been associated with approach, reward-seeking behaviors, and goal-directed actions (Carver & White, 1994; Hasking, 2006, 2007; Kambouropoulos & Staiger, 2004; Tull et al., 2010). However, emotion-focused coping strategies, like acceptance and positive reinterpretation and growth, may facilitate goal resolution and the active pursuit of desired outcomes and encompass the full range of BAS related processes (Corr, 2008;

Ferguson, 2001). In other words, accepting aspects of an event and reinterpreting situations as they change may be essential in one's journey to goal resolution and attainment and might be most appropriate when encountering uncontrollable events.

The results also suggest that BIS sensitivity predicts avoidance-focused coping behaviors, possibly to avoid risk and the negative stimuli associated with stressors, and thus, lower distress levels (Bolger, 1990; Carver & White, 1994; Connor-Smith & Flachsbart, 2007; Corr, 2004, 2008; Gable et al., 2000; Hasking, 2006, 2007; Hundt et al., 2008; Kambouropoulos & Staiger, 2004; Meyer et al., 2005). This avoidance pattern becomes reinforced through short-term relief from distress and minimizes motivation to return to stressors, contributing to further avoidance (Lengua, Sandler, West, Wolchik, & Curran, 1999). In addition, cognitive appraisals of stressors serve as the mechanism through which BIS sensitivity predicts avoidance-focused coping behaviors, such that BIS sensitivity predicts appraisals possibly associated with threat and uncontrollability, which may overwhelm and paralyze individuals, leading to avoidance (McNaughton & Corr, 2008a; Sweeny, 2008). Surprisingly, BAS sensitivity also predicted avoidance-focused coping behaviors, demonstrating that BAS facilitates the use of various coping strategies, possibly due to the underlying predisposition for impulsivity, leading one to resort to many coping behaviors in a trial-and-error approach. In addition, BAS sensitivity may lead to avoidance when certain events do not possess the potential for reward and/or immediate resolution to stress. Finally, the interaction of BIS and BAS did not predict avoidance-focused coping, which was inconsistent with the hypothesis derived from the JSH (Corr, 2002). However, Corr (2004) noted that JSH effects occur

when weak appetitive or aversive stimuli are utilized; whereas, separable effects arise when strong stimuli are used. Also, a study comparing SSH and JSH effects found that separable effects were more likely to occur during deliberate and thoughtful processing of events (Gomez, Cooper, McOrmond, & Tatlow, 2004). Participants may have recalled distinctively stressful events and completed the measures in intentional ways, leading to independent BIS and BAS sensitivity effects.

Overall, these results provide greater insight into the factors that contribute to the use of various coping efforts. BAS and BIS differentially predict coping strategies, with BAS predicting a variety of coping strategies and BIS predicting avoidance-focused coping behaviors. Further, the current study clarifies one mechanism, cognitive appraisals of perceived stress, through which BIS leads to avoidance in response to stress. However, the mechanism that links BAS to a range of coping behaviors is still unclear from the current study. It is apparent that cognitive appraisals of perceived stress do not mediate or moderate the relationship between BAS and coping behaviors which suggests that other variables may serve as conduits in this relationship. One challenge in determining the latter includes the heterogeneity of BAS-related goals (Corr, 2008). In other words, the multi-faceted nature of BAS leads to challenges in uncovering a single behavioral pattern in coping with stress. Such complexity explains the use of many coping forms, and thus, the flexible repertoire of coping behaviors seen in the current study (Corr, 2008). Future research could benefit from evaluating how different mechanisms become active depending on the stressor type and the BAS-related goal, leading to distinct coping patterns. Further, the type of coping strategy does not seem to depend on the interaction

of reinforcement sensitivity systems and the level of cognitive appraisals of perceived stress. Thus, future research should examine other variables that may moderate the relationship between the latter two variables. Although cognitive appraisals of perceived stress did not moderate these relationships, perceived stress alone predicted all coping strategies in the exploratory models. These results suggest that one's perception of events influences the stress and coping process, with greater levels of perceived stress leading to the use of emotion- and avoidance-focused coping and lower perceived stress contributing to problem-focused efforts. Taken together, these results highlight the importance of reinforcement sensitivity systems and cognitive appraisals in the stress and coping process.

Sex

Males and females differed in BAS and BIS sensitivity, suggesting that there may be underlying variations in the ways in which sexes interpret and respond to their environments. Following from this interpretation, females held more cognitive appraisals of perceived stress and reported using more emotion-focused coping behaviors, compared to men. These results are consistent with previous research which demonstrates that females perceive events as more stressful and utilize more emotion-focused coping strategies and that males perceive less stress and are more likely to engage in approach behaviors associated with BAS (Eaton & Bradley, 2008; Lengua & Stormshak, 2000; Tamres, Janicki, & Helgeson, 2002). Further, BAS sensitivity appears to promote task-oriented efforts for females, but not for males, as seen from the moderating role of sex in the relationship between BAS and problem-focused coping behaviors. Thus, BAS

sensitivity leads to differential coping styles for males and females and should be considered in developing clinical interventions (see below). However, one's identified biological sex provides limited information about the complexities of gender in the stress and coping process (Bem, 1974). Thus, an evaluation of masculine and feminine traits and behaviors associated with one's particular role in society might be a meaningful way to determine the influence of gender in coping behaviors.

Research Implications

The current study contributes to the existing literature in many unique ways. As mentioned previously, Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping originally abandoned personality variables and adopted the view that such stable factors provide limited information about coping behaviors and emotional responses to the specific demands of various stressors (Folkman & Lazarus, 1985; Folkman et al., 1986). In the past decade, there was an influx in studies evaluating the influence of personality on coping, which provided preliminary evidence that personality variables influence the stress and coping process (Carver & Connor-Smith, 2010; Power & Hill, 2010). The current study extended this literature in introducing an additional model of personality and demonstrating how a biologically-based theory of personality can explain individual differences in cognitive appraisals and coping behaviors. The results provide preliminary evidence that personality factors play a role in the stress and coping process, and thus, cannot be ignored, as once thought. Further, this study adds to the growing literature examining the cognitive and behavioral influences of reinforcement sensitivity theory, which has received criticism for failing to acknowledge

cognitive processes in behavior and emotion (Corr, 2008; McNaughton & Corr, 2008a, 2008b). Specifically, the behavioral approach and inhibition system sensitivities possibly serve as biological predispositions for a number of coping behaviors, most likely through the influence of cognitive appraisals of stressors in the case of avoidance-focused coping strategies. The link of these previously distinct literatures into one study will allow researchers to construct more thorough hypotheses of how individuals process and cope with stress.

Not only does this study merge two bodies of literature, but the results also highlight the complexities in the stress and coping process. Since the cognitive appraisal stage serves as a critical mediator in the stress and coping process, it is significant that this variable was evaluated (Bolger & Zuckerman, 1995; Folkman et al., 1986). As hypothesized, BIS sensitivity, predicted cognitive appraisals of perceived stress, demonstrating that this system has an influence on complex cognitive processes and suggesting that biological and cognitive constructs can be integrated (Corr, 2008; McNaughton & Corr, 2008b). Further, the current study is one of the few to test the mediation of cognitive appraisals in the relationship between personality and general coping patterns. Several previous studies suggest that BIS sensitivity is associated with avoidance behaviors (Carver & White, 1994; Gable, Reis, & Elliot, 2000; Kambouropoulos & Staiger, 2004; Meyer et al., 2005; Hasking, 2006, 2007), yet this study specifically assessed and confirmed the direct effect of BIS sensitivity on avoidance-focused coping behaviors and the indirect effect through cognitive appraisals. The results highlight the importance of cognitive appraisals in the stress and coping

process, particularly in the use of avoidance-focused coping behaviors, and encourage researchers to consider cognitive factors that may influence coping selection. The current study also indicates that the stress and coping process may differ in males and females and prompts researchers to evaluate such subtleties in future research. Finally, the results suggest that reinforcement sensitivity systems interact in predicting problem-focused coping behaviors. However, the pattern of effects are not entirely consistent with the JSH, because both BAS and BIS sensitivities facilitated the outcome; whereas the JSH proposes that BAS and BIS would serve facilitatory and antagonistic roles, respectively (Corr, 2002; McNaughton & Corr, 2008a). The activation of both systems possibly allows individuals to shift attention and energy toward active and deliberate attempts to target stressors, which may serve as an adaptive function when the stressors are controllable (Pickering & Smillie, 2008). This result not only underscores the need to analyze the ways in which personality variables interact to predict coping strategies, but also highlights the need to examine the JSH further, because such traits may not function as independently as previously assumed. Although the current results are not entirely consistent with the JSH, they emphasize the appraisal stage, as well as some level of interdependence of personality variables in coping behaviors.

Clinical Implications

There are a number of clinical implications that arise from this study. First, as mentioned previously, this study highlights the role of personality factors in predicting cognitive appraisals and subsequent coping behaviors. In addition to advancing research, these results provide a personality framework to mental health professionals in

understanding the stress and coping process. The behavioral approach and behavioral inhibition systems may exert influences early in childhood and contribute to the ways in which events are appraised and interpreted, fostering coping selection tendencies throughout life. These coping patterns and possible outcomes may be dependent upon one's sex, particularly in the case of problem solving efforts. This insight into the role of reinforcement sensitivity systems in the stress and coping process will only assist in the development of effective prevention and intervention programs that account for the unique needs across individuals (Connor-Smith & Flachsbart, 2007).

In addition to providing awareness to mental health professionals, the current results underscore the significance of cognitive-behavioral techniques, like cognitive restructuring and self monitoring, to assist individuals in creating realistic appraisals of stress, thus increasing their self-efficacy as problem solvers and decreasing the impact of stressors (Eaton & Bradley, 2008). The ability to gain a sense of control and address emotional experiences may minimize excessive use of avoidance-focused forms of coping and lead to a flexible coping style. In addition, several studies have found that reliance on avoidance-focused coping behaviors are associated with poorer psychological and physical health outcomes (Littleton, Horsley, John, & Nelson, 2007; Moskowitz, Hult, Bussolari, & Acree, 2009; Nes & Segerstrom, 2006; Ramirez-Maestre et al., 2008). Further, Lam and McBride-Chang (2007) propose that coping flexibility can function as a protective factor during times of stress and should be included in interventions. Although the current study did not include deliberately varied situations nor evaluate coping outcomes, the results suggest that a mental health professional's assessment of one's

cognitive appraisals can serve as a prevention strategy for reliance on avoidance and subsequent negative outcomes. Not only do the current results emphasize the importance of cognitive-behavioral therapy, but they also highlight the utility of dialectical behavior therapy (DBT; Linehan, 1993) skills, particularly in response to uncontrollable events. Although many stressors are controllable and warrant problem-solving, others are truly uncontrollable and require distress tolerance, mindfulness, and emotion regulation strategies. DBT provides the tools for individuals to cope effectively through replacing ineffective, maladaptive, and/or consistent avoidant responses with skillful behaviors (Linehan, 1993). Therefore, mental health professionals can encourage and assist those with inflexible coping styles to reevaluate their cognitive appraisals of stressful events and maladaptive behavioral styles, and thus, adopt a range of coping responses and ideally experience positive outcomes.

Study Limitations

The current study had a number of limitations that should be addressed. First, this study utilized a retrospective self-report format for all measures. Memory errors and social desirability affect the accuracy of self-reported coping (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Skinner et al., 2003). Further, personality variables may influence recall of certain coping forms, such that individuals remember coping behaviors that are familiar and congruent with their self-perceptions (Carver & Connor-Smith, 2010). On a related note, the mediation results should be interpreted with caution, given the cross-sectional nature of this study, and thus, the difficulty in determining temporal precedence of the study variables (Baron & Kenny, 1986; Kraemer,

Stice, Kazdin, Offord, & Kupfer, 2001). Semi-structured interviews, observations, and/or multiple reporters may provide more accurate measures of coping behaviors (Compas et al., 2001). In addition, the retrospective nature of the study may have lead to difficulties in assessing several coping responses over time (Ptacek, Smith, Espe, & Raffety, 1994). Several studies have found that retrospective coping reports are only moderately related to immediate or daily reports (Connor-Smith & Flachsbart, 2007; Ptacek et al., 1994). Thus, future studies should examine coping behaviors using the daily diary method which is better suited to capture the dynamic process of stress and coping (DeLongis & Holtzman, 2005; Ptacek et al., 2008; Tennen et al., 2000). Tennen and colleagues (2000) also indicate that this design permits investigators to minimize recall error and bias and note stressors, coping attempts, and outcomes as the event unfolds. Evaluating the stress and coping process in creative ways can allow researchers to understand fully its dynamic nature.

In addition, all of the regression models, individually, accounted for 30% or less of the explained variance, suggesting that other factors, like stressor severity and/or chronicity, may also predict cognitive appraisals and/or coping behaviors. Similarly, the significant beta coefficients ranged in magnitude (.14 - .49), indicating that there were modest direct effects of the predictors on the criterion variables. Two recent meta-analysis also found small to moderate effects of personality variables on coping selection and stressed that these findings should be considered noteworthy, because small effects are compounded when considering the number of stressors one encounters over the course of a lifetime (Connor-Smith & Flachsbart, 2007; Solberg Nes & Segerstrom,

2006). Taken together, these results should be interpreted in light of these limitations and considered in future research.

Future Directions for Research

This study increased the field's understanding of how reinforcement sensitivity systems influence general appraisals and coping responses following stress using a cross-sectional design. As mentioned previously, alternative research designs, like daily dairies and observational assessments, can outline thorough and immediate information about the dynamic relationship between personality, appraisals, and coping behaviors. In addition to using such designs, future research should consider how contextual factors and various types of stressors influence the relationship between personality variables and the stress and coping process. More specifically, resources, coping options, and costs and benefits of various coping behaviors, as well as the nature of the stressors, including chronicity, domain, and controllability, may play important roles in this process (Carver & Connor-Smith, 2010). For example, chronic stressors, like ongoing health problems, may differentially affect the coping process, compared to acute stressors, like discrete interpersonal disagreements. The context might also influence reinforcement sensitivity activity. For example, the behavioral inhibition system may be more relevant in threat events, like a car accident or failing an exam; whereas, the behavioral approach system may be more pertinent during interpersonal stressors. Further, stressors range in the degree of controllability, such that individuals have limited control over events, like a death, but more control in other situations, like completion of academic projects. Future research should also consider how BAS and BIS influence the stress and coping process

before a stressor occurs. Specifically, BAS and BIS sensitivities influence stressor exposure, as well as the type of stressors experienced (Carver & Connor-Smith, 2010; Van Der Linden et al., 2007). For example, BAS sensitivity is more likely to lead to experiences associated with risk and challenge, whereas, BIS is more likely to predict events associated with predictability and security (Grant & Langan-Fox, 2006)..Thus, future research could benefit from utilizing alternative research designs to determine how specific stressors and contextual factors interact with personality variables to predict cognitive appraisals and subsequent coping behaviors.

The current study also evaluated general coping patterns following stress. Since the results suggest that reinforcement sensitivity systems and cognitive appraisals play roles in predicting broad coping strategies in response to real-life events, future research should assess how these variables relate to specific coping strategies. Evaluating the latter will highlight the complexity of the coping process and provide finer distinctions between coping responses (Compas et al., 2001; Skinner et al., 2003). However, this task will prove challenging, given that many coping measures use such broad coping categories or contain specific coping subscales with few items and low internal consistency reliability. Further, future research could benefit from analyzing how reinforcement sensitivity systems and cognitive appraisals influence the intended function, perceived effectiveness, and short- and long-term outcomes of various coping responses (Bolger & Zuckerman, 1995; Ferguson, 2001). Additional individual variables, like coping self-efficacy and mastery of coping behaviors, can affect one's response to stressors and should be evaluated in the future. Similarly, the mechanisms which link BAS and a range of coping

behaviors remain unclear, indicating that future research could evaluate possible conduits in this relationship. Another direction for future research is to investigate how personality and situational variables interact in the choice of emotion-focused versus avoidance coping, as well as the relative outcomes of these choices. Although the analysis of these factors was beyond the scope of the current study, knowledge regarding psychological and environmental outcomes will be beneficial to mental health professionals in formulating effective and appropriate interventions.

The current study also highlighted the need for future research addressing the role of sociocultural variables in the stress and coping process. Sociocultural variables, like socioeconomic status and ethnic identity, interact with personality and stress to predict various cognitive appraisals and coping patterns. Previous research suggests that demographic factors affect coping patterns, yet most of these studies evaluate these variables in categorical terms which oversimplify and reduce the meaningfulness of social and cultural influences (Eaton & Bradley, 2008; McIlvane, 2007; Sweeny, 2008; Tamres et al., 2002; Tan, Jensen, Thornby, & Anderson, 2005). Given that this study was the first to assess both the behavioral approach and inhibition systems and cognitive appraisals in predicting coping behaviors, the results prompt a number of directions for future research.

Conclusion

The current study aimed to determine the influence of biologically-based systems of personality in predicting cognitive appraisals of stress and subsequent coping responses. The results suggest that cognitive appraisals associated with threat and

uncontrollability, as evidenced by perceived stress, mediate the relationship between the behavioral inhibition system and avoidance-focused coping strategies. Although two hypotheses were not confirmed, the findings provide insight into the factors that contribute to the use of problem- and emotion-focused coping behaviors. Taken together, the current study serves as a unique integration of two previously independent, yet influential, theories, Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping and Gray's (1970) reinforcement sensitivity theory, and strengthens our understanding of the roles of personality and cognitive appraisals in predicting coping responses to stress.

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APPENDIX A

TABLES AND FIGURES

Table 1

Participant Demographic Characteristics (n = 242)

Demographic Characteristic		*n*	%
Sex	Male	68	28.1
	Female	174	71.9
Ethnicity	Caucasian	152	62.8
	African-American	52	21.5
	Asian/Pacific Islander	12	5.0
	Hispanic	11	4.5
	American Indian/ Alaskan Native	1	0.4
	Multiracial	12	5.0
	Other	2	0.8
Age	18	140	57.9
	19	59	24.4
	20	21	8.7
	21	5	2.1
	22	4	1.7
	23	5	2.1
	26	2	0.8
	27	1	0.4
	29	2	0.8
	35	1	0.4
	47	1	0.4
	Missing	1	0.4
Annual Family Income	$0 - $15,000	9	3.7
	$15,001 - $30,000	48	19.8
	$30,001 - $50,000	70	28.9
	$50,001 - $80,000	66	27.3
	> $80,000	42	17.4
	Missing	7	2.9

Table 2

Descriptive Statistics for Study Variables (n = 242)

Variable	M	SD	Range	Cronbach's α
BAS Sensitivity	11.42	4.35	2 – 22	.78
BIS Sensitivity	12.34	5.50	0 – 24	.85
Cognitive Appraisals (PSS)	20.62	7.45	3 – 39	.88
Problem-focused coping	60.11	9.90	26 – 81	.89
Emotion-focused coping	27.12	4.47	15 – 36	.74
Avoidance-focused coping	40.60	8.00	24 – 71	.78

Note: BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale

Table 3

Correlations Among the Study Variables

Variable	1	2	3	4	5	6
1. BAS sensitivity	--	.004	.074	.118	.109	.195**
2. BIS sensitivity		--	.513**	.074	.125	.224**
3. Cognitive Appraisals (PSS)			--	-.010	.269**	.250**
4. Problem-focused coping				--	.596**	.249**
5. Emotion-focused coping					--	.307**
6. Avoidance-focused coping						--

Note: ** $p < .01$; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale

Table 4

Hierarchical Multiple Regression Analysis Using Behavioral Approach System Sensitivity and the Interaction of the Behavioral Approach and Behavioral Inhibition System Sensitivities to Predict Problem-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.044	.046
Sex	2.80	1.52	.13		
Ethnicity [1]					
Age	.13	.25	.04		
Family Income	.99	.61	.11		
Step 2				.070	.075
BAS Sensitivity	1.24	.66	.13		
BIS Sensitivity	.87	.66	.09		
Step 3				.089	.098
BAS Sensitivity X BIS Sensitivity	1.42	.67	.14*		

Note: * $p < .05$; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System

[1] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted problem-focused coping behaviors.

Table 5

Hierarchical Multiple Regression Analysis Using the Interaction of the Behavioral Approach and Behavioral Inhibition System Sensitivities to Predict Cognitive Appraisals (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.084	.092
Sex	2.51	1.00	.15*		
Ethnicity [2]					
Age	-.22	.16	-.08		
Family Income	-.27	.40	-.04		
Step 2				.304	.437
BAS Sensitivity	.61	.43	.08		
BIS Sensitivity	3.57	.44	.49**		
Step 3				.304	.437
BAS Sensitivity X BIS Sensitivity	.03	.44	.003		

Note: * p < .05; ** p < .01; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System

[2] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted cognitive appraisals.

Table 6

Hierarchical Multiple Regression Analysis Using Behavioral Inhibition System Sensitivity and the Interaction of the Behavioral Inhibition and Behavioral Approach System Sensitivities to Predict Emotion-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.096	.106
Sex	2.873	.67	.29**		
Ethnicity [3]					
Age	.01	.11	.01		
Family Income	-.02	.27	-.01		
Step 2				.127	.145
BAS Sensitivity	.68	.29	.15*		
BIS Sensitivity	.44	.29	.10		
Step 3				.128	.147
BIS Sensitivity X BAS Sensitivity	.09	.30	.02		

Note: * p < .05; ** p < .01; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System

[3] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted emotion-focused coping behaviors.

Table 7

Hierarchical Multiple Regression Analysis Using Behavioral Inhibition System Sensitivity and the Interaction of the Behavioral Inhibition and Behavioral Approach System Sensitivities to Predict Avoidance-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.047	.049
Sex	-.46	1.20	-.03		
Ethnicity [4]					
Age	-.003	.19	-.001		
Family Income	.09	.48	.01		
Step 2				.131	.151
BAS Sensitivity	1.55	.52	.19**		
BIS Sensitivity	1.76	.53	.22**		
Step 3				.135	.156
BIS Sensitivity X BAS Sensitivity	.54	.53	.07		

Note: ** p < .01; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System

[4] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted avoidance-focused coping behaviors.

Table 8

Hierarchical Multiple Regression Analysis Using Behavioral Inhibition System Sensitivity to Predict Cognitive Appraisals (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.084	.092
Sex	2.514	.99	.15*		
Ethnicity [5]					
Age	-.21	.16	-.08		
Family Income	-.27	.40	-.04		
Step 2				.304	.437
BAS Sensitivity	.61	.43	.08		
BIS Sensitivity	3.57	.43	.49**		

Note: * $p < .05$; ** $p < .01$; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System

[5] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted cognitive appraisals.

Table 9

Hierarchical Multiple Regression Analysis Using Cognitive Appraisals and Behavioral Inhibition System Sensitivity to Predict Avoidance-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.047	.049
Sex	-.87	1.20	-.05		
Ethnicity [6]					
Age	.08	.19	.03		
Family Income	.18	.48	.03		
Step 2				.085	.093
BAS Sensitivity	1.45	.51	.18**		
Step 3				.157	.186
BIS Sensitivity	1.04	.59	.13		
Cognitive Appraisals (PSS)	.21	.08	.20**		

Note: ** p < .01; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale

[6] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted avoidance-focused coping behaviors.

Table 10

Hierarchical Multiple Regression Analysis Using the Interaction of the Behavioral Approach System Sensitivity and Cognitive Appraisals to Predict Problem-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.044	.046
Sex	3.39	1.55	.16*		
Ethnicity [7]					
Age	.19	.25	.05		
Family Income	1.04	.61	.12		
Step 2				.070	.075
BAS Sensitivity	1.43	.66	.15*		
BIS Sensitivity	1.58	.75	.16*		
Step 3				.082	.089
Cognitive Appraisals (PSS)	-1.60	.78	-.16*		
Step 4				.102	.114
BAS Sensitivity X Cognitive Appraisals	.93	.67	.09		
BIS Sensitivity X Cognitive Appraisals	-.92	.62	-.10		

Note: * $p < .05$; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale

[7] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted avoidance-focused coping behaviors.

Table 11

Hierarchical Multiple Regression Analysis Using the Interaction of the Behavioral Approach System Sensitivity and Cognitive Appraisals to Predict Emotion-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.096	.106
Sex	2.59	.68	.26**		
Ethnicity [8]					
Age	.04	.11	.03		
Family Income	.01	.27	.004		
Step 2				.127	.145
BAS Sensitivity	.62	.29	.14*		
BIS Sensitivity	.06	.33	.01		
Step 3				.151	.178
Cognitive Appraisals (PSS)	.78	.34	.17*		
Step 4				.153	.181
BAS Sensitivity X Cognitive Appraisals	.13	.30	.03		
BIS Sensitivity X Cognitive Appraisals	-.13	.27	-.03		

Note: * p < .05; ** p < .01; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale

[8] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted avoidance-focused coping behaviors.

Table 12

Hierarchical Multiple Regression Analysis Using the Interaction of the Behavioral Approach System Sensitivity and Cognitive Appraisals to Predict Avoidance-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.047	.049
Sex	-1.24	1.22	-.07		
Ethnicity [9]					
Age	.02	.19	.005		
Family Income	.18	.48	.03		
Step 2				.131	.151
BAS Sensitivity	1.40	.51	.18**		
BIS Sensitivity	1.05	.59	.13		
Step 3				.157	.186
Cognitive Appraisals (PSS)	1.68	.61	.21**		
Step 4				.169	.203
BAS Sensitivity X Cognitive Appraisals	.81	.53	.10		
BIS Sensitivity X Cognitive Appraisals	.49	.49	.07		

Note: ** $p < .01$; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale

[9] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted avoidance-focused coping behaviors.

Table 13

Hierarchical Multiple Regression Analysis Using the Interaction of the Behavioral Approach System Sensitivity and Sex and the Interaction of the Behavioral Inhibition System Sensitivity and Sex to Predict Problem-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.044	.046
Sex	2.03	1.55	.09		
Ethnicity [10]					
Age	.22	.24	.06		
Family Income	1.30	.61	.15*		
Step 2				.070	.075
BAS Sensitivity	-5.77	2.65	-.59*		
BIS Sensitivity	2.82	2.51	.28		
Step 3				.104	.116
BAS Sensitivity X Sex	4.10	1.48	.74**		
BIS Sensitivity X Sex	-1.14	1.42	-.21		

Note: * $p < .05$; ** $p < .01$; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System

[10] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted avoidance-focused coping behaviors.

Table 14

Hierarchical Multiple Regression Analysis Using the Interaction of the Behavioral Approach System Sensitivity and Sex and the Interaction of the Behavioral Inhibition System Sensitivity and Sex to Predict Emotion-Focused Coping Behaviors (n = 242)

Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.096	.106
Sex	2.74	.69	.28**		
Ethnicity [11]					
Age	.02	.11	.01		
Family Income	.03	.27	.006		
Step 2				.127	.145
BAS Sensitivity	-.53	1.18	-.12		
BIS Sensitivity	.41	1.12	.09		
Step 3				.132	.152
BAS Sensitivity X Sex	.70	.66	.28		
BIS Sensitivity X Sex	.01	.63	.005		

Note: * $p < .05$; ** $p < .01$; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System

[11] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted avoidance-focused coping behaviors.

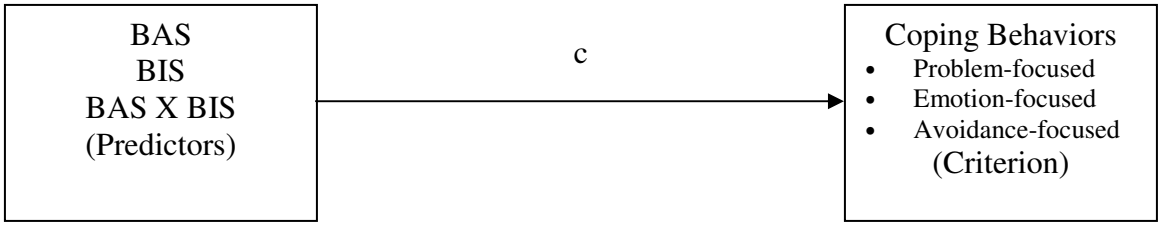
Table 15

Hierarchical Multiple Regression Analysis Using the Interaction of the Behavioral Approach System Sensitivity and Sex and the Interaction of the Behavioral Inhibition System Sensitivity and Sex to Predict Avoidance-Focused Coping Behaviors (n = 242)

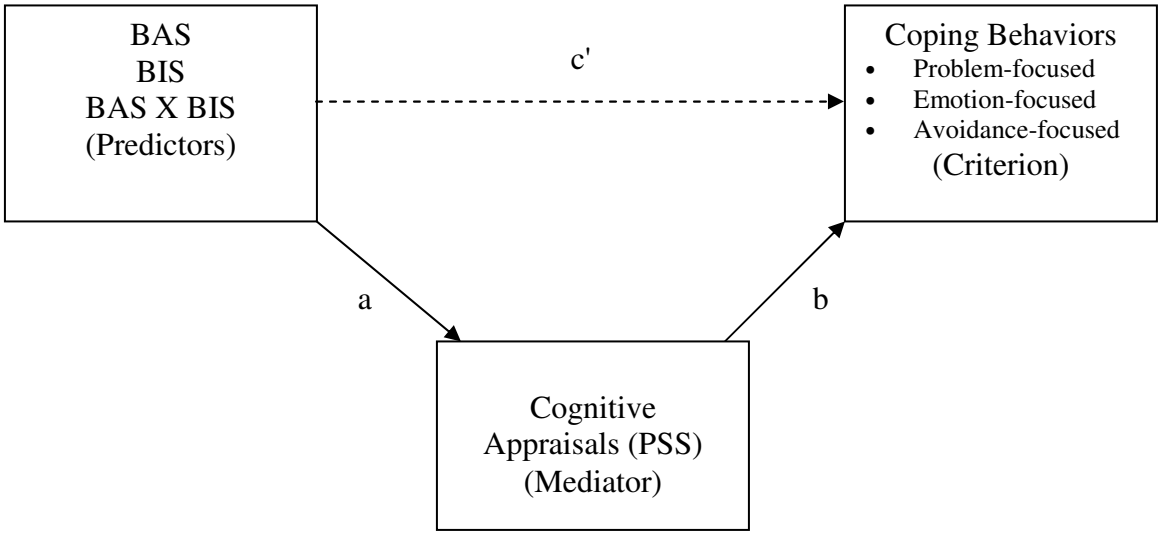
Predictor Variable	B	SE B	ß	R^2	f^2
Step 1				.047	.049
Sex	-.59	1.24	-.03		
Ethnicity [12]					
Age	.02	.19	.006		
Family Income	.13	.49	.02		
Step 2				.131	.151
BAS Sensitivity	.91	2.12	.11		
BIS Sensitivity	3.63	2.01	.46		
Step 3				.135	.156
BAS Sensitivity X Sex	.40	1.18	.09		
BIS Sensitivity X Sex	-1.08	1.14	-.24		

Note: * $p < .05$; ** $p < .01$; B = unstandardized beta coefficient; SE B = standard error; ß = standardized beta coefficient; f^2 = effect size for multiple regression; BAS = Behavioral Approach System; BIS = Behavioral Inhibition System

[12] The ethnicity variable was dummy coded, creating six ethnicity variables which were entered into step 1. None of the ethnicity variables significantly predicted avoidance-focused coping behaviors.



a) Direct Pathway



b) Mediated Pathway

Figure 1. Hypothesized Relationships Between Reinforcement Sensitivity Systems and Coping Behaviors. In the direct pathway, BAS, BIS, and the BAS X BIS interaction were hypothesized to predict problem-, emotion-, and avoidance-focused coping strategies. However, cognitive appraisals were hypothesized to mediate the relationship between reinforcement sensitivity systems and coping behaviors, as depicted in the mediated pathway. BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale.

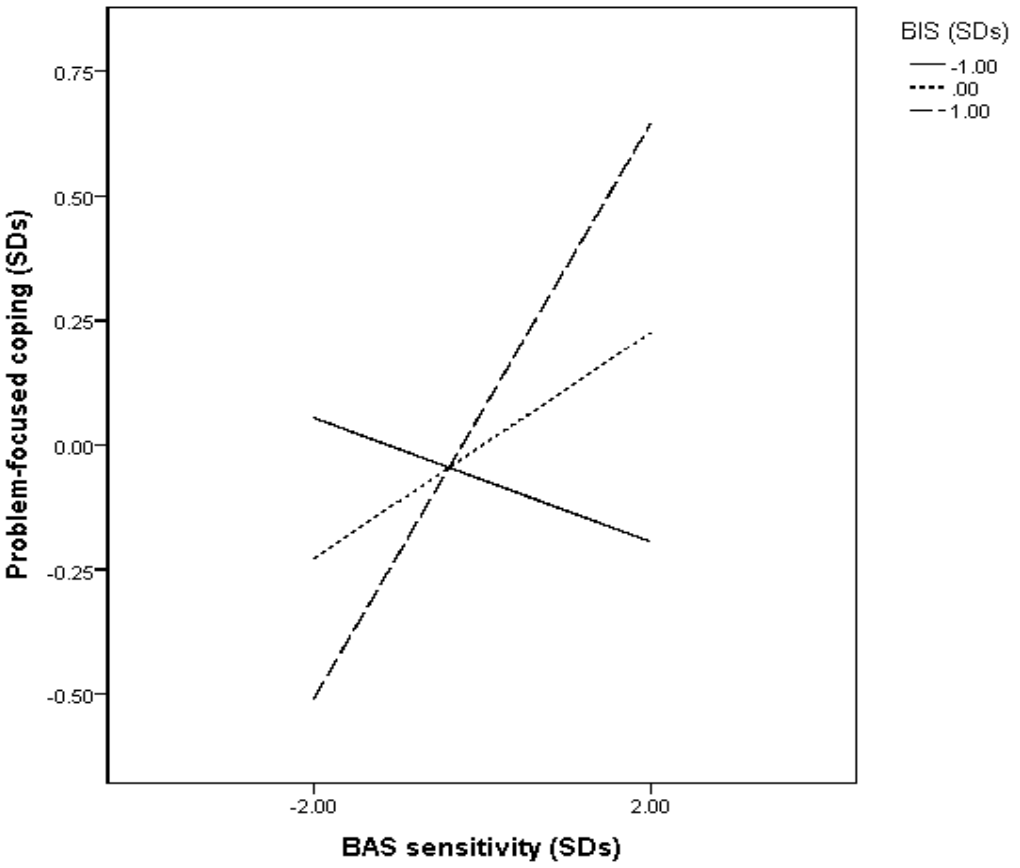
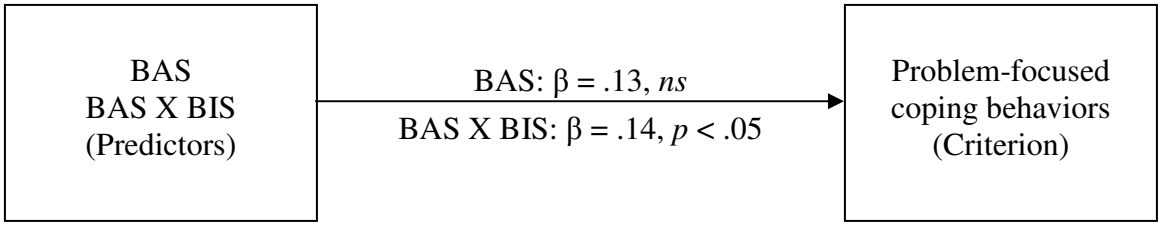
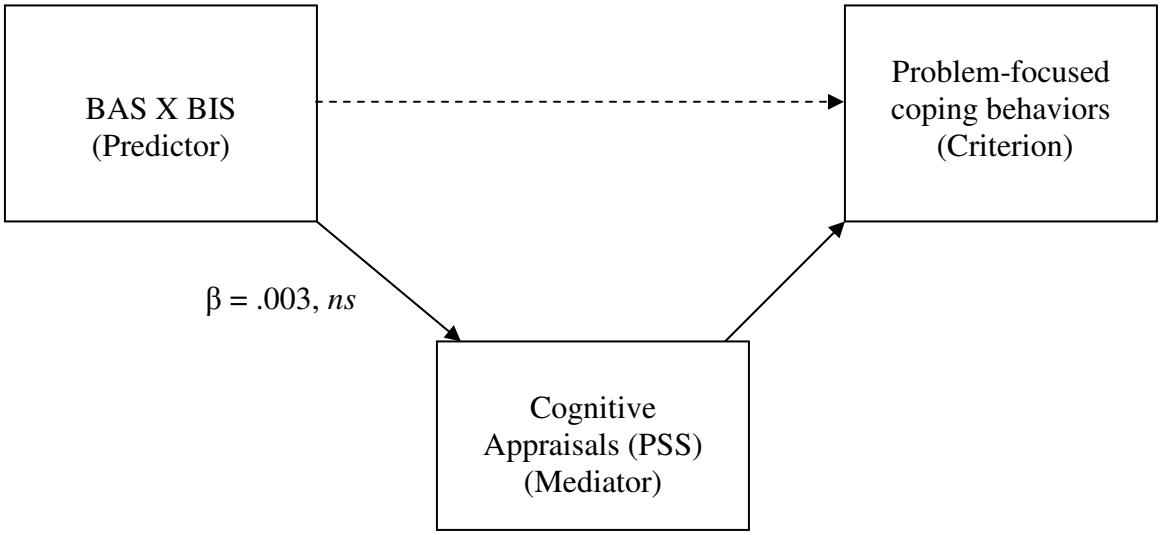


Figure 2. Interaction of BAS and BIS Sensitivities in Predicting Problem-Focused Coping. BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; SDs = Standard Deviations.

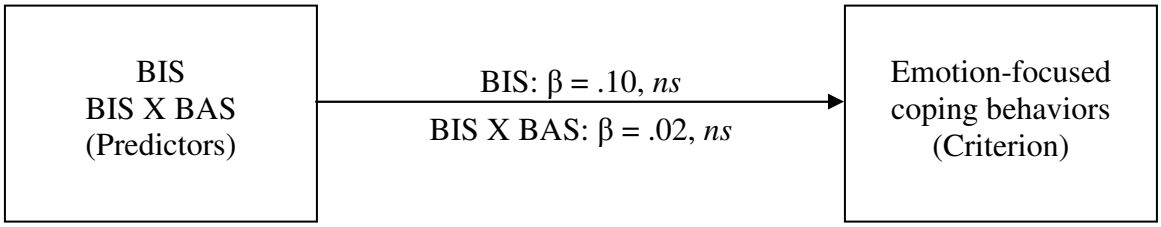


a) Direct Pathways



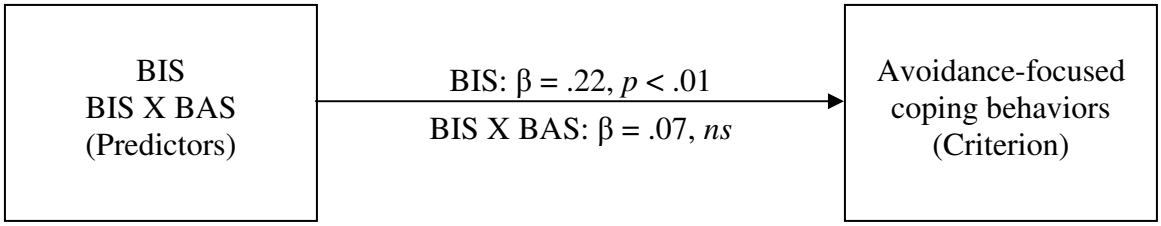
b) Mediated Pathway

Figure 3. Relationships Between Reinforcement Sensitivity Systems and Problem-Focused Behaviors. In the direct pathway, the interaction of BAS and BIS predicted problem-focused coping behaviors; however, BAS did not. The interaction of BAS and BIS did not predict cognitive appraisals of stress. BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale.

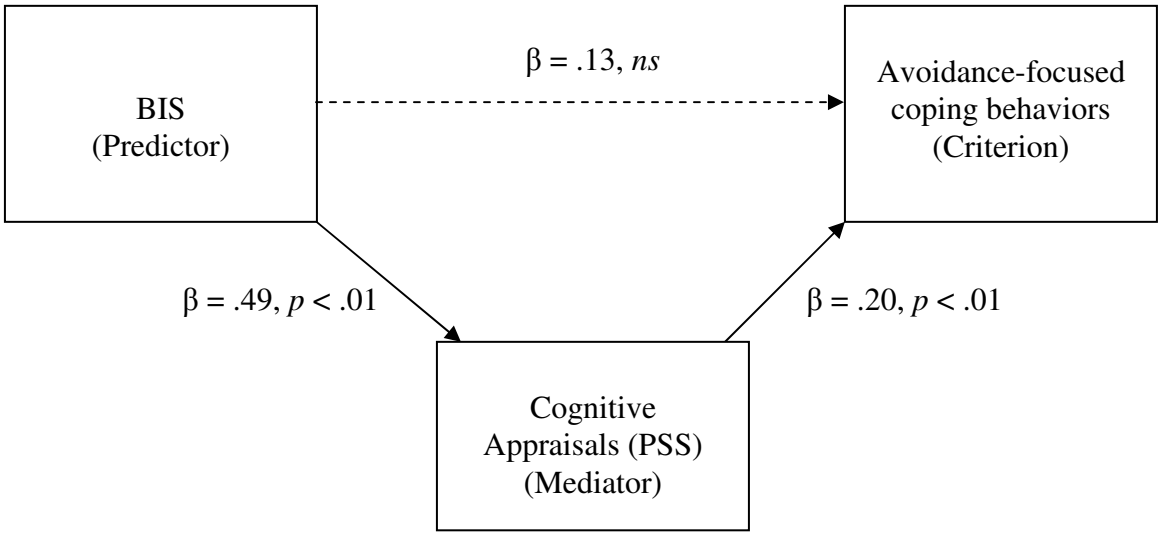


a) Direct Pathways

Figure 4. Relationships Between Reinforcement Sensitivity Systems and Emotion-Focused Coping Behaviors. Neither BIS nor the interaction of BIS and BAS predicted emotion-focused coping behaviors. Thus, the mediated pathway was not tested. BAS = Behavioral Approach System; BIS = Behavioral Inhibition System.



a) Direct Pathways



b) Mediated Pathway

Figure 5. Relationships Between Reinforcement Sensitivity Systems and Avoidance-Focused Coping Behaviors. In the direct pathway, BIS predicted avoidance-focused coping behaviors. Further, cognitive appraisals fully mediated this relationship, such that BIS no longer predicted avoidance-focused coping behaviors when cognitive appraisals were also in the model. BAS = Behavioral Approach System; BIS = Behavioral Inhibition System; PSS = Perceived Stress Scale.

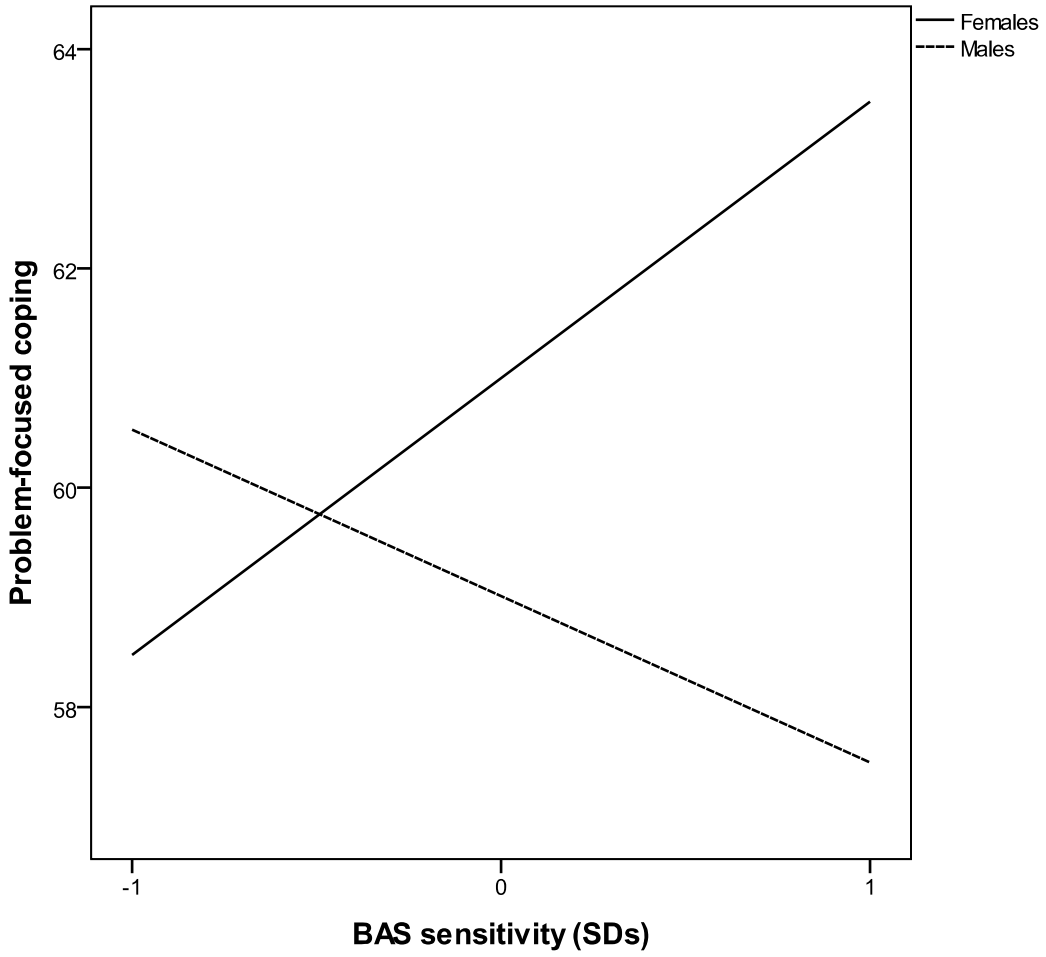


Figure 6. Interaction of BAS and Sex in Predicting Problem-Focused Coping. BAS = Behavioral Approach System; SDs = Standard Deviations.

APPENDIX B

DEMOGRAPHICS

Name: _____
Email: _____
Phone number: _____
Age: _____

Sex:
○ Male
○ Female
○ Transgender
○ Other _____

Marital status:
○ Single
○ Married
○ Divorced
○ Widowed

Ethnic Background:
○ Caucasian
○ Black/African American
○ Asian/Pacific Islander
○ Hispanic
○ American Indian/Alaskan Native
○ Multiracial
○ Other

Please indicate your family's approximate annual income:
○ $0 - $15,000
○ $15,001 – $30,000
○ $30,001 - $50,000
○ $50,001 - $80,000
○ $80,001 and above

APPENDIX C

SPSRQ/IFS

Answer each question by choosing "YES" or "NO" and then blacken in the circle that indicates how you GENERALLY feel. There are no right or wrong answers, or trick questions. Work quickly and don't think too much about the exact meaning of the questions but answer which seems to describe how you GENERALLY feel.

	Yes	No
1. Do you often refrain from doing something because you are afraid of it being illegal?		
2. Does the good prospect of obtaining money motivate you strongly to do something to do some things?		
3. Do you prefer not to ask for something when you are not sure you will obtain it?		
4. Are you frequently encouraged to act by the possibility of being valued in your work, in your studies, with your friends or with your family?		
5. Are you often afraid of new or unexpected situations?		
6. Do you often meet people that you find physically attractive?		
7. Is it difficult for you to telephone someone you do not know?		
8. Do you like to take some drugs because of the pleasure you get from them?		
9. Do you often renounce your rights when you know you can avoid a quarrel with a person or an organization?		
10. Do you often do things to be praised?		
11. As a child, were you troubled by punishments at home or in school?		
12. Do you like being the center of attention at a party or a social meeting?		
13. In tasks that you are not prepared for, do you attach great importance to the possibility of failure?		
14. Do you spend a lot of your time on obtaining a good image?		
15. Are you easily discouraged in difficult situations?		
16. On some mornings, do you get out of bed when you wake up?		
17. Do you need people to show their affection for you all the time?		
18. Are you a shy person?		
19. When you are in a group, do you try to make your opinions the most intelligent or the funniest?		
20. Have there been a number of occasions when people you know have said hello to you?		
21. Whenever possible, do you avoid demonstrating your skills for fear of being embarrassed?		
22. Do you often take the opportunity to pick up people you find		

attractive?		
23. When you are with a group, do you find you have difficulties selecting a good topic to talk about?		
24. Have there been times when you have dialed a telephone number only to find that the line was busy?		
25. As a child, did you do a lot of things to get people's approval?		
26. Is it often difficult for you to fall asleep when you think about things you have done or must do?		
27. At times when you were ill or tired, have you felt like going to bed early?		
28. Does the possibility of social advancement move you to action, even if this involves not playing fair?		
29. Do you think a lot before complaining in a restaurant if your meal is not well prepared?		
30. Do you generally give preference to those activities that imply an immediate gain?		
31. Would you be bothered if you had to return to a store when you noticed you were given the wrong change?		
32. Do you often have trouble resisting the temptation of doing forbidden things?		
33. Whenever you can, do you avoid going to unknown places?		
34. On some occasions, have you noticed that some other people are better dressed than you?		
35. Do you like to compete and do everything you can to win?		
36. Are you often worried about things that you said or did?		
37. Is it easy for you to associate tastes and smells to very pleasant events?		
38. Is driving from New York to San Francisco generally faster than flying between these cities?		
39. Would it be difficult for you to ask your boss for a raise (salary increase)?		
40. Are there a large number of objects or sensations that remind you of pleasant events?		
41. Do you generally try to avoid speaking in public?		
42. Are most light bulbs powered by electricity?		
43. When you start to play with a slot machine, is it often difficult for you to stop?		
44. Do you, on a regular basis, think that you could do more things if it was not for your insecurity or fear?		
45. Do you sometimes do things for quick gains?		
46. Do you go at least once every two years to visit either northern Scotland or some part of Scandinavia?		
47. Comparing yourself to people you know, are you afraid of many		

things?		
48. Does your attention easily stray from your work in the presence of an attractive stranger?		
49. Can you remember a time when you talked with someone who wore glasses?		
50. Do you often find yourself worrying about things to the extent that performance in intellectual abilities is impaired?		
51. Are you interested in money to the point of being able to do risky jobs?		
52. Sometimes when you walk down the sidewalk, do you see children playing?		
53. Do you often refrain from doing something you like in order not to be rejected or disapproved of by others?		
54. Do you like to put competitive ingredients in all of your activities?		
55. Have you ever combed your hair before going out in the morning?		
56. Generally, do you pay more attention to threats than pleasant events?		
57. Would you like to be a socially powerful person?		
58. Do you often walk with a limp, which is the result of a skydiving accident?		
59. Do you often refrain from doing something because of your fear of being embarrassed?		
60. Do you like displaying your physical abilities even though this may involve danger?		
61. Can you remember a single occasion when you have ridden on a bus?		

APPENDIX D

PERCEIVED STRESS SCALE

The questions in this scale ask you about your feelings and thoughts **during the last month** when you encountered stress. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?	0 1 2 3 4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0 1 2 3 4
3. In the last month, how often have you felt nervous and "stressed"?	0 1 2 3 4
4. In the last month, how often have you felt confident in your ability to handle your personal problems?	0 1 2 3 4
5. In the last month, how often have you felt that things were going your way?	0 1 2 3 4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0 1 2 3 4
7. In the last month, how often have you been able to control irritations in your life?	0 1 2 3 4
8. In the last month, how often have you felt that you were on top of things?	0 1 2 3 4
9. In the last month, how often have you been angered because of the things that were outside of your control?	0 1 2 3 4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0 1 2 3 4

APPENDIX E

COPE

We are interested in how people respond when they confront difficult or stressful events. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you did **during the last month** when you experienced stressful events. Obviously, different events bring out somewhat different responses, but think about what you did when you are under a lot of stress during the last month.

Fill in the correct circle using the response choices listed below. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU—not what you think "most people" would say or do. **Indicate what YOU did in the last month when YOU experienced stressful events.**

1 = I didn't do this at all 2 = I did this a little bit 3 = I did this a medium amount 4 = I did this a lot

1. I try to grow as a person as a result of the experience.	1 2 3 4
2. I turn to work or other substitute activities to take my mind off things.	1 2 3 4
3. I get upset and let my emotions out.	1 2 3 4
4. I try to get advice from someone about what to do.	1 2 3 4
5. I concentrate my efforts on doing something about it.	1 2 3 4
6. I say to myself "this isn't real.	1 2 3 4
7. I put my trust in God.	1 2 3 4
8. I admit to myself that I can't deal with it, and quit trying.	1 2 3 4
9. I restrain myself from doing anything too quickly.	1 2 3 4
10. I discuss my feelings with someone.	1 2 3 4
11. I use alcohol or drugs to make myself feel better.	1 2 3 4
12. I talk to someone to find out more about the situation.	1 2 3 4
13. I daydream about things other than this.	1 2 3 4
14. I get upset, and am really aware of it.	1 2 3 4
15. I seek God's help.	1 2 3 4
16. I make a plan of action.	1 2 3 4
17. I hold off doing anything about it until the situation permits.	1 2 3 4
18. I try to get emotional support from friends or relatives.	1 2 3 4
19. I just give up trying to reach my goal.	1 2 3 4
20. I take additional action to try to get rid of the problem.	1 2 3 4
21. I try to lose myself for a while by drinking alcohol or taking drugs.	1 2 3 4
22. I refuse to believe that it has happened.	1 2 3 4

23. I let my feelings out.	1 2 3 4
24. I try to see it in a different light, to make it seem more positive.	1 2 3 4
25. I talk to someone who could do something concrete about the problem.	1 2 3 4
26. I sleep more than usual.	1 2 3 4
27. I try to come up with a strategy about what to do.	1 2 3 4
28. I focus on dealing with this problem, and if necessary let other things slide a little.	1 2 3 4
29. I get sympathy and understanding from someone.	1 2 3 4
30. I drink alcohol or take drugs, in order to think about it less.	1 2 3 4
31. I give up the attempt to get what I want.	1 2 3 4
32. I look for something good in what is happening.	1 2 3 4
33. I think about how I might best handle the problem.	1 2 3 4
34. I pretend that it hasn't really happened.	1 2 3 4
35. I make sure not to make matters worse by acting too soon.	1 2 3 4
36. I try hard to prevent other things from interfering with my efforts at dealing with this.	1 2 3 4
37. I go to movies or watch tv, to think about it less.	1 2 3 4
38. I accept the reality of the fact that it happened.	1 2 3 4
39. I ask people who have had similar experiences what they did.	1 2 3 4
40. I feel a lot of emotional distress and I find myself expressing those feelings a lot.	1 2 3 4
41. I try to find comfort in my religion.	1 2 3 4
42. I reduce the amount of effort I'm putting into solving the problem.	1 2 3 4
43. I talk to someone about how I feel.	1 2 3 4
44. I use alcohol or drugs to help me get through it.	1 2 3 4
45. I learn to live with it.	1 2 3 4
46. I think hard about what steps to take.	1 2 3 4
47. I act as though it hasn't even happened.	1 2 3 4
48. I do what has to be done, one step at a time.	1 2 3 4
49. I pray more than usual.	1 2 3 4